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**FINAL**

**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
FISCAL YEAR 2001**

**NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

**CONTRACT TASK ORDER 0172**

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## LIST OF ACRONYMS AND ABBREVIATIONS

ABAL	Area Below Action Level
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
Baker	Baker Environmental, Inc.
BTAG	Biological Technical Assistance Group
CAX	Naval Weapons Station, Cheatham Annex Site
CD	Compact Disk (3-10)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action-Navy
CNO	Chief of Naval Operations
COPC	Chemical of Potential Concern
CTO	Contract Task Order
CWM	Chemical Warfare Materials
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DERP	Defense Environmental Restoration Program
DON	Department of the Navy
DOD	Department of Defense
DS-2	Decontamination Agent (Site 10, 1)
ERN	Environmental Restoration Navy
ESE	Environmental Science and Engineering, Inc.
EE/CA	Engineering Evaluation/Cost Analysis
EPIC	Aerial Photographic Analysis
ERA	Ecological Risk Assessment
ESI	Expanded Site Inspection
FFA	Federal Facilities Agreement
FISC	Fleet and Industrial Supply Center
FR	Federal Register
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
FY	Fiscal Year
H	Horizontal
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
HRSD	Hampton Roads Sanitation District
IAS	Initial Assessment Study
IR	Installation Restoration
IV	Intravenous

# **LIST OF ACRONYMS AND ABBREVIATIONS** **(Continued)**

LANTDIV	Atlantic Division, Naval Facilities Engineering Command
MCL	Maximum Contaminant Level
NAB	Naval Airforce Base
NACIP	Navy Assessment and Control of Installation Pollutants
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NFRAP	No Further Response Action Planned
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil, and Lubricant
ppm	Parts per Million
PRAP	Proposed Remedial Action Plan
PRP	Potentially Responsible Party
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RAA	Remedial Action Alternatives
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SARA	Superfund Amendments and Reauthorization Act of 1986
SATA	Site Assessment Technical Assistance
SI	Site Inspection
SMP	Site Management Plan
SSP	Site Screening Process
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit

**LIST OF ACRONYMS AND ABBREVIATIONS**  
**(Continued)**

TAL	Target Analyte List
TCA	Trichloroethane
TCDD	Tetrachlorodibenzo-p-dioxin
TCE	Trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
TCRA	Time-Critical Removal Action
TNT	Trinitrotoluene
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substance Control Act
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance (3-9)
V	Vertical
VGS	Virginia Groundwater Standards
VDEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compound
WPNSTA	Naval Weapons Station
µg/kg	micrograms per kilogram



## 1.0 INTRODUCTION

This document presents the Fiscal Year (FY) 2001 Installation Restoration (IR) Program Site Management Plan (SMP) for the Naval Weapons Station Yorktown, Yorktown Virginia, Cheatham Annex Site (CAX). This SMP was prepared by Baker Environmental, Inc. (Baker), under contract to the Atlantic Division, Naval Facilities Engineering Command (LANTDIV) under the Comprehensive Long-Term Environmental Action – Navy (CLEAN II) Contract N62470-95-D-6007, Contract Task Order (CTO) 0172.

### 1.1 Cheatham Annex Location and History

Cheatham Annex, located in Williamsburg, Virginia, was established in June 1943 as a satellite unit of the Naval Supply Depot to provide bulk storage facilities. Prior to 1943, CAX had been the location of the Penniman Shell Loading Plant, which was a large powder and shell loading facility operated by Dupont during World War I. The facility closed in 1918. Between 1918 and 1943, the property was used for farming or left idle until CAX was commissioned in 1943. Since 1943, Cheatham Annex has been used for receiving, storing, packaging, and shipping materials to federal facilities on the east coast and to major distribution centers in Europe.

Previously operated as an annex to Fleet and Industrial Supply Center (FISC), Norfolk, which is the world's largest navy supply center, CAX provided logistic and supply support to naval shore installations. CAX is the Navy Sea System Command's East Coast consolidated stock point for major shipboard mechanical, electronic, and some navigational equipment. In addition to receiving, storing, issuing, packing and shipping navy stock material, particularly large, bulky (often unique) shipboard equipment (e.g., submarine periscopes, ship propellers, bull gears, antennae, and sonar domes), CAX provides warehouse and distribution services for 39 Storage Authorization Programs and tenant organizations.

In July 1987, CAX was designated the Hampton Roads Navy Recreational Complex. Today the mission of CAX includes supplying Atlantic Fleet ships and providing recreational opportunities to military and civilian personnel; 55% of CAX is undeveloped and rich in natural resources. Outdoor recreational facilities and activities available include: 13 cabins, 19 recreational vehicle (RV) sites, camp sites, an 18-hole golf course, swimming pool, ball fields, freshwater and saltwater fishing, boating, wildlife watching and hunting (Department of the Navy [DON], 1998). CAX currently operates under the Naval Weapons Station (WPNSTA) Yorktown. The transition of CAX control from FISC to WPNSTA occurred in October 1998. The location of CAX is presented in Figure 1-1.

#### CAX Property

At inception, CAX occupied approximately 3,349 acres. Several portions of the original base have since been declared surplus and transferred to other government jurisdictions, including the National Park Service, the Commonwealth of Virginia, and York County. CAX is currently comprised of 1,578 acres. The Activity is divided into two separate parcels, with the larger parcel situated along the banks of the York River. Almost all of the activities at CAX (administration, training, maintenance, support, and housing) take place in this portion of the Activity. The smaller parcel is located south of the Colonial National Historic Parkway (Colonial Parkway). This area contains the Activity's water supply (Jones Pond) and is used mainly as a watershed protection area. CAX and the surrounding properties are shown on Figure 1-2.

## **1.2 Objectives of the Installation Restoration Program Site Management Plan**

The environmental program at CAX follows the requirements set forth by the IR Program, which include identification, investigation, and cleanup of contamination from hazardous substances, pollutants and contaminants, and correction of other environmental damage posing threats to human health or the environment. The Department of the Navy (DON) initiated its IR Program in 1980 in response to potential threats associated with releases of toxic and hazardous materials into the environment. The IR Program is discussed in further detail in Section 2.3.

As environmental-related activities (i.e., investigations and actions) have proceeded, and the amount of documentation and information pertaining to various sites increased, it became necessary to provide a mechanism for tracking and scheduling such activities in the form of a Site Management Plan. This document will help to provide a smooth transition for changing personnel involved in the IR Program at CAX.

The IR Program Site Management Plan for CAX will be updated annually. The primary focus of the IR Program Site Management Plan is as follows:

- Summarize the environmental history of CAX
- Identify and describe individual sites
- Describe the IR Program history and regulatory framework
- Document past, current and projected IR-related activities at each site
- Provide detailed project schedules for IR-related activities for the impending fiscal year
- Provide projected schedules for IR projects to be completed in subsequent fiscal years

To date a total of 12 sites and five Areas of Concern (AOCs) have been identified at CAX. Not all of the sites/AOCs warrant investigation or actions. All CAX sites and AOCs are discussed in this document. Although CAX is now part of WPNSTA, the IR programs for CAX and WPNSTA are managed separately. The locations of CAX IR sites and AOCs are shown on Figure 1-3.

## **1.3 Format of the IR Program Site Management Plan**

The remainder of this document consists of the following sections:

### **Section 2.0 - Regulatory Framework**

Descriptions of the IR Program and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process/framework are presented.

### **Section 3.0 – Installation Restoration Program Actions and Investigations**

IR Program actions/investigations conducted to date are summarized in general terms.

### **Section 4.0 – Site Histories and Status**

Descriptions of each site are presented along with past, current, and future activities. IR actions/investigations conducted to date are summarized for each site. Maps showing site layouts and locations of previously collected samples are provided.

## **Section 5.0 - Schedules of Future Installation Restoration Program Activities**

IR Program schedules for FY 2001 and a portion of FY 2002 are presented.

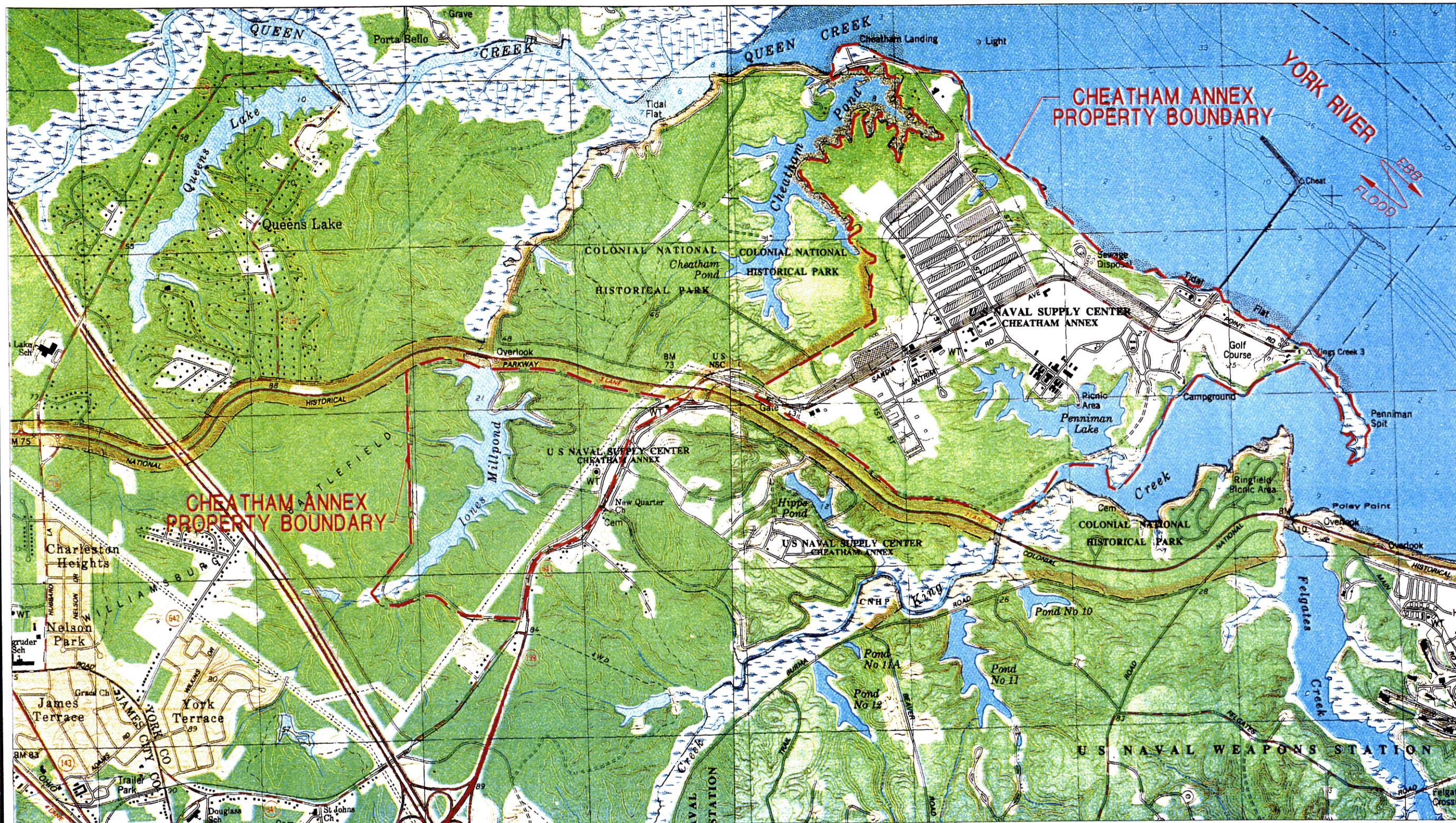
## **Section 6.0 - References**

References used in compiling the IR Program SMP are listed.

**SECTION 1.0**  
**FIGURES**

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2000 0 1000 2000  
1 inch = 2000 ft.

SOURCE: CLAY BANK, VA AND WILLIAMSBURG, VA  
U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLES.

**Baker**  
Baker Environmental, Inc.

FIGURE 1-1  
GENERAL LOCATION MAP  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



# IDENTIFIED NAVY IR SITES

- ① LANDFILL NEAR INCINERATOR
- ② CONTAMINATED FOOD DISPOSAL AREA
- ③ SUBMARINE DYE DISPOSAL AREA
- ④ MEDICAL SUPPLIES DISPOSAL AREA
- ⑤ PHOTOGRAPHIC CHEMICALS DISPOSAL AREA
- ⑥ SPOILED FOOD DISPOSAL AREA
- ⑦ OLD DuPONT DISPOSAL AREA
- ⑧ LANDFILL NEAR BUILDING CAD 14
- ⑨ TRANSFORMER STORAGE AREA
- ⑩ DECONTAMINATION AGENT DISPOSAL AREA NEAR FIRST STREET
- ⑪ BONE YARD
- ⑫ DISPOSAL SITE NEAR WATER TOWER

# IDENTIFIED NAVY IR AREAS OF CONCERN

- ① SCRAP METAL DUMP
- ② DEXTROSE DUMP
- ③ CAD 11/12 POND BANK
- ④ IR SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA
- ⑤ DEBRIS AREA

2000 0 1000 2000  
1 inch = 2000 ft.

**Baker**

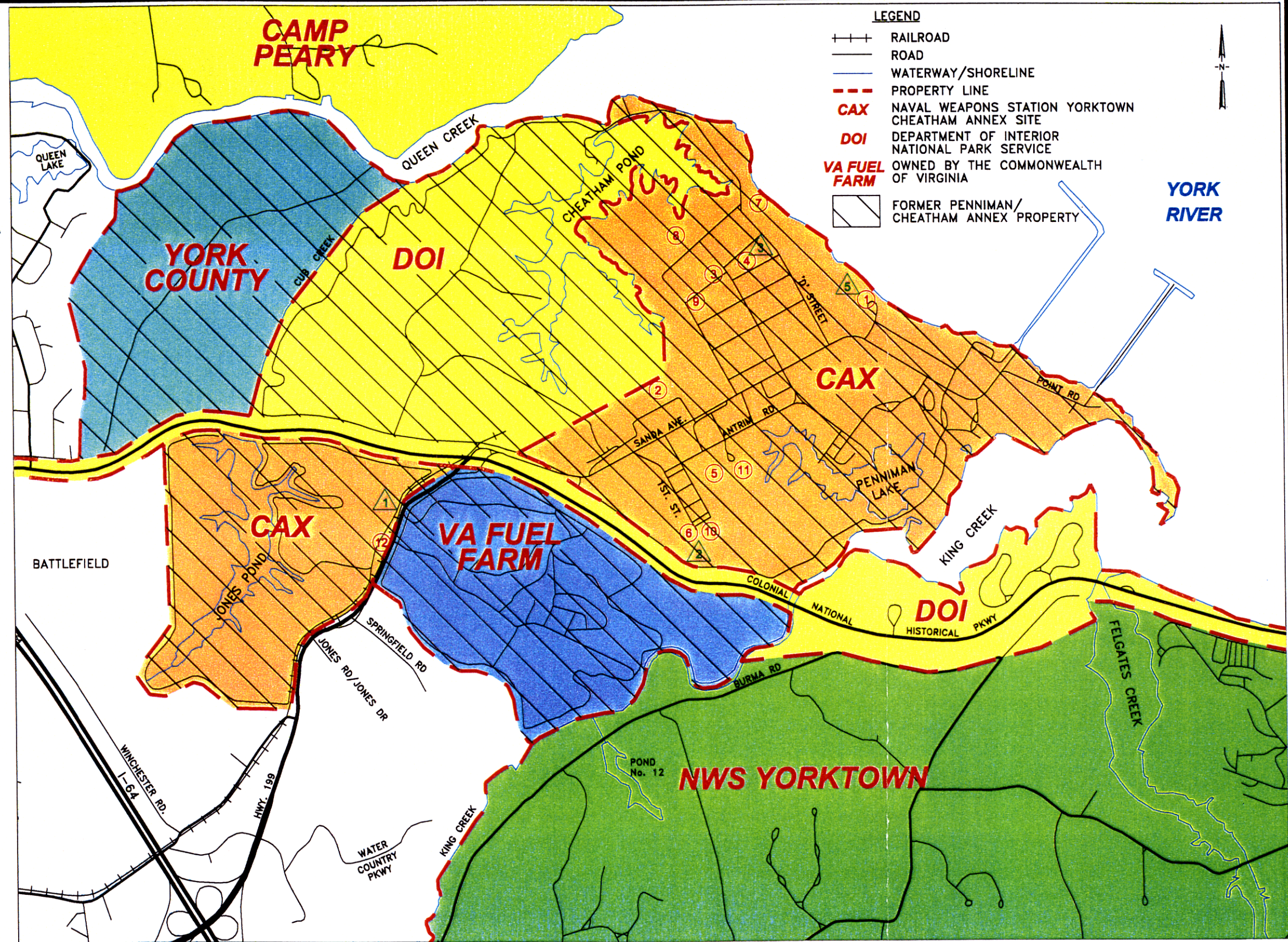


FIGURE 1-2  
OWNERSHIP MAP WITH NAVY IR SITES  
AND AREAS OF CONCERN

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE





## **2.0 REGULATORY FRAMEWORK**

CERCLA and the Superfund Amendments and Reauthorization Act of 1986 (SARA) established programs for the cleanup of hazardous waste disposal and spill sites. The IR Program is a component of the Defense Environmental Restoration Program (DERP) which is one of the programs established under CERCLA/SARA by the DON. The purpose and scope of the IR Program and CERCLA are summarized in the following subsections. The United States Environmental Protection Agency (USEPA) and Virginia Department of Environmental Quality (VDEQ) have been actively involved in the IR Program at CAX since 1997. Currently, these agencies are invited to provide comments and feedback on all documents that are prepared under the IR Program. Prior to 1997, these agencies had minimal involvement with the IR Program at CAX. To date all IR Program actions initiated at CAX have been strictly voluntary and consistent with other DON installations.

### **2.1 CERCLA Regulatory Framework**

The purpose of the Superfund Program is to address threats to human health or the environment resulting from releases or potential releases of hazardous substances from abandoned or uncontrolled hazardous waste sites. The USEPA has the primary responsibility for managing activities under the Superfund Program.

CERCLA provided the Federal government, for the first time, authority to take direct action or to force the potentially responsible party (PRP) to respond to emergencies involving uncontrolled releases of hazardous substances. The statute also required the Federal government to develop longer-term solutions for the nation's most serious hazardous waste problems. This statute included:

- Identifying sites where releases of hazardous substances had already occurred or might occur and pose a serious threat to human health, welfare, or the environment.
- Taking appropriate action to remedy such releases.
- Ensuring that parties responsible for the releases pay for the cleanup actions. This payment could be either the initial funding of cleanup actions or the repayment of Federal funds spent on response actions.

In order to fund Federal response actions, CERCLA created a Trust Fund, or "Superfund," consisting of an initial \$1.6 billion. This Trust Fund was financed primarily with a tax on crude oil and 42 commercially-used chemicals. Even though the Superfund Program may finance the response action, recovery of these Federal funds is sought from those parties responsible for the hazardous release.

On October 17, 1986, Congress passed amendments to CERCLA, called SARA, which implemented several important changes and additions to strengthen and expand the Superfund Program. SARA increased the size of the CERCLA Trust Fund to \$8.5 billion and refined its financing. SARA also stressed and continues to stress developing and using permanent remedies. Title III of SARA increased community awareness and access to information regarding the presence of extremely hazardous chemicals in the community.



CERCLA asserts that each PRP associated with a site be held liable and places the cost burden on that party. CERCLA is a strict liability statute, which means that responsible parties are liable without regard to negligence or fault. In situations where more than one PRP is involved, it may be difficult to determine each PRP's contribution to the release. In these situations, the courts have held that an owner, operator, waste generator, or transporter may be held liable for the entire cost of site cleanup, unless it can be shown that the harm is "divisible" (e.g., there are two or more physically separate areas of contamination). This concept, known as, "joint and several liability," is a tool that encourages PRPs to perform cleanups.

USEPA has the primary responsibility of managing the cleanup and enforcement activities under Superfund. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) is a comprehensive regulation (dated March 8, 1990) that contains the guidelines and procedures for implementing the Superfund Program (USEPA, 1992a).

## **2.2 CERCLA Process Activities**

The investigations and remedial activities to be completed at CAX will follow the guidelines established by the USEPA as part of the CERCLA process. Once an area has been identified as potentially containing contaminated media (soil, groundwater, sediment, etc.) and the site screening investigation and risk screening process (both limited in scope) have determined that a potential risk to human health and/or the environment exists, the site will be subjected to the Remedial Investigation/Feasibility Study (RI/FS) process. However, a removal action and/or an interim remedial action also may be appropriate. The decision to implement one or a combination of these actions at established RI/FS sites is dependent upon the nature and extent of contamination at the site; how well the site is characterized; the degree of associated human health and/or environmental risks; and the complexity of the potential remedial actions (i.e., the feasibility of the optimal remedy). CAX was recently included on the National Priorities List (NPL) on December 1, 2000. However, prior to being listed on the NPL, the CAX IR Program voluntarily followed CERCLA guidance. The CERCLA processes are described below and depicted on Figure 2-1.

### **2.2.1 Preliminary Assessment/Site Inspection**

Once a site is identified, a site assessment is performed, beginning with a Preliminary Assessment (PA) to determine if the site poses a potential hazard and whether further action is necessary. During the PA, any available documentation pertaining to the site is reviewed. In addition, there may be a site visit, but sampling generally does not occur at this time.

If information generated during the PA reveals that potential environmental contamination exists but does not pose an immediate threat, a more extensive study, called a Site Inspection (SI), is performed. Typically, the SI involves a site visit and sample collection to define and further characterize the nature of the contamination at a site. If results of the SI indicate the site presents an imminent and substantial threat, a removal action may be implemented (USEPA, 1992b).

At CAX, the PA was implemented in the form of an Initial Assessment Study (IAS) in 1984 by the Naval Engineering and Environmental Support Activity (NEESA). The findings of this study are summarized in Section 3.0.

### 2.2.2 Expanded Site Inspection

The objective of the Expanded Site Inspection (ESI) is to collect data necessary to prepare a Hazard Ranking System (HRS) scoring package to evaluate the site for potential inclusion on the NPL. The HRS is a numerically-based scoring system that uses information from the PA and SI to assign sites scores based on releases or potential releases of contaminants, characteristics of substances, and people and sensitive environment's that would be impacted by a release. To fully evaluate the site and to fulfill HRS documentation requirements, the ESI will:

- Investigate and document critical hypotheses or assumptions not completely tested during the SI
- Collect samples to determine whether hazardous substances or contaminants are attributable to past/current site operations
- Collect samples to establish representative background levels
- Collect any other missing (HRS) data for pathways of concern

When environmental samples do not provide the information needed for HRS documentation requirements, investigations also may need to include special field activities. The purpose of these procedures, which are beyond the screening scope of the SI, is to supply data to refine and document the site score. Special ESI field activities may include monitoring well installation, air sampling, geophysical studies, drum or tank sampling, borings, immunoassay screening to define the extent of contamination, and complex background sampling studies.

Sampling during the ESI should be designed to support and document HRS requirements, including: 1) observed releases of hazardous substances relative to background; 2) observed contamination; and 3) levels of contamination. The ESI should facilitate collection of a complete set of Quality Assurance/Quality Control (QA/QC) and background samples to fully and confidently document and attribute releases to the site.

The scope of an ESI is not necessarily larger than a SI but depends on the data gaps remaining after all previous investigation information is evaluated. The ESI also differs from the SI by emphasizing collection of all missing non-sampling information for pathways of concern. These data may be used to support previous documentation or references, fulfill remaining data requirements, and/or identify other sources of contamination in the vicinity of the site.

At the conclusion of the field activities, an ESI report summarizing findings and analytical results is prepared. Per USEPA regional and State instructions, the ESI should evaluate all site data according to the HRS. The HRS package consists of the HRS documentation record, reference materials, HRS score sheets, and site narrative summaries along with other administrative requirements as specified in *Regional Quality Control Guidance for NPL Candidate Sites* (Office of Solid Waste and Emergency Response [OSWER] Directive 9345.1-08, USEPA, 1991). Preparing the HRS package is not considered part of SI or ESI activities. However, all data necessary to document a HRS score should be collected during the ESI (USEPA, 1992b).

When applied to investigating individual sites, the ESI also functions as another decision node and data evaluation process by which the most appropriate option in the CERCLA process (e.g., no action, removal action, or remedial action) may be selected. If sufficient data is collected, the ESI may be functionally equivalent to a Remedial Investigation (RI). The SI/ESI process is shown on Figure 2-2. To date, no ESIs have been performed at CAX.

### **2.2.3 Remedial Investigation/Feasibility Study Process**

The RI/FS phase is generally the most involved step in the CERCLA process. Figure 2-3 outlines the steps to remedial action under the RI/FS process. For the RI/FS, an RI, baseline risk assessment, and Feasibility Study (FS) are completed, along with a Proposed Remedial Action Plan (PRAP) prior to a formal public comment period. After public comments have been addressed as part of the Responsiveness Summary in the Record of Decision (ROD), the ROD is placed in the Administrative Record. Subsequent to completion and agency approval of the ROD, remedial design activities are initiated, followed by the implementation of the remedial action. Following are general descriptions of the key components of the RI/FS process:

- Remedial Investigation (RI): An assessment of the nature and extent of contamination and the associated health and environmental risks
- Feasibility Study (FS): Development and analysis of the range of cleanup alternatives for the site
- Proposed Remedial Action Plan (PRAP): Identifies a preferred remedial alternative and explains why the alternative was selected. Allows for public comment
- Record of Decision (ROD): The official report documenting the background information on the site and describing the chosen remedy and why it was selected

Presumptive remedies also are part of the RI/FS process. Presumptive remedies apply to certain types of sites such as landfills which received a variety of waste types and where containment of these wastes is the preferred remedial alternative. Candidate sites for presumptive remedies should be identified early in the investigative process. Once identified, presumptive remedy sites follow the same general process as presented in Figure 2-3, but have a streamlined RI/FS. Streamlined RI/FS documents evaluate the sites and site dynamics, evaluate risks and bypass the initial screening and identification of remedial alternatives other than the preferred alternative (e.g., containment).

If unacceptable human health or ecological risks do not exist, sites are recommended for no further action. If risks do exist, removal actions, interim actions, or additional RI/FS activities are proposed in order to mitigate the risks or further delineate the extent of contamination.

To date, one RI "Remedial Investigation Interim Report" has been prepared for sites at CAX. This document addressed Site 1 - Landfill near Incinerator, Site 9 - Transformer Storage Area, Site 10 - Decontamination Agent Disposal Area near First Street, and Site 11 - Bone Yard. For these sites it should be noted that the status of the report was interim and that the RI/FS process was not taken to its completion (i.e., RODs have not been prepared). The findings of the Interim RI are presented in Section 3.0.

Bypassing the SI or ESI phase and commencing immediately with the RI/FS may be cost-effective and beneficial if known contamination or specific details regarding previous practices is present and it is reasonably certain that in-depth study of the site is required.

#### **2.2.4 Removal Actions**

Removal actions are those actions taken to clean up or remove released hazardous substances from the environment. In addition, a removal action also may be implemented to mitigate, minimize, or prevent damage to human health and the environment from a release or threat of a release by limiting exposure to the hazardous substances (i.e., security fencing or access limitation). Removal actions are classified as either time-critical or non-time-critical. Time-critical removal actions (TCRAs) are conducted when there is an imminent and substantial threat to human health and the environment, such as corroded drums of wastes that are leaking into groundwater. Non-time-critical removal actions are defined as actions that, based on the degree of potential risk to human health and/or the environment, may be delayed for six months or more before on-site cleanup is initiated.

A removal action may be completed any time during the evaluation or remedial processes. However, it will often begin prior to the completion of the RI/FS to mitigate the spread of contamination.

Figure 2-4 shows the general process for non-time-critical removal actions. Rather than preparing an FS, an Engineering Evaluation/Cost Analysis (EE/CA), which focuses only on the individual contaminated medium to be addressed, is completed. Other potentially contaminated media will be addressed as part of the RI/FS process and are not addressed in the EE/CA. Because the scope of a removal action is typically smaller than a final, full-scale remedial action, the time frames for completion of the EE/CA, related design efforts, and implementation of the removal action are much shorter than for a full-scale FS. The opportunity for public involvement is similar to the FS, with a public comment period and an Action Memorandum Decision Document (similar to a ROD in the RI/FS process) completed to document the evaluation and choice of removal action procedures. It should be noted that a removal action may become the final remedial action if the risk screening/assessment results indicate that further remediation is not required for protection of human health and the environment. Where no further action is required at a site that has undergone a removal action, a no action ROD will be signed between the concerned parties in order to remove the site from the program.

A TCRA for Site 1 (Landfill near Incinerator) was conducted in January 2000 to address erosion of the landfill perimeter. No other removal actions have been performed at CAX to date. Details regarding the removal action at Site 1 are presented in Section 4.0.

#### **2.2.5 Interim Remedial Actions**

Interim remedial actions are those activities designed to provide temporary mitigation of potential risks posed by a site until a final remedial action is selected. As with removal actions, interim remedial actions usually take place prior to initiation of a full-scale FS because of the risks posed by the contamination in the area. For example, installation of a groundwater pump and treat system to control plume migration would be considered an early remedial action. Initiation of remedial action early in the CERCLA process might reduce costs in the long-term by limiting the extent of contaminant migration.



The interim remedial action process is shown in Figure 2-5. Rather than preparing an FS, a focused FS is completed, as is an early action ROD to document the activities to be performed. Design and implementation activities follow. It should be noted that an early remedial action may become the final remedial action, if the risk screening/assessment results indicate that further remediation is not required.

No interim remedial actions have been conducted at CAX to date.

#### **2.2.6 Presumptive Remedies**

Presumptive remedies help to streamline the site cleanup process by eliminating the need for initial identification and screening of numerous remedial alternatives during the FS process. Presumptive remedies are preferred technologies for common categories of sites based on historical patterns of remedy selection at similar types of sites. The selection of a presumptive remedy must be considered at the beginning of the RI/FS process so that particular attention can be directed to the risk evaluation, areas of potential contaminant migration, and identification of "hot spots."

No presumptive remedies have been implemented at CAX to date. However, the long-term remedial measures that are planned for Site 1 – Landfill near Incinerator to address erosion of the landfill perimeter and the large debris pile may be implemented in the form of a presumptive remedy.

#### **2.2.7 Treatability Studies**

Treatability studies may be conducted prior to finalization of FS reports or prior to removal actions to better evaluate the performance of a particular technology. Treatability studies are conducted to:

- Provide sufficient data to allow treatment alternatives to be fully developed and evaluated
- Support the remedial design of a selected alternative
- Reduce cost and performance uncertainties for treatment alternatives to acceptable cleanup levels to aid in remedy selection

Bench-scale treatability studies may be performed to evaluate the effectiveness of using certain technologies.

#### **2.2.8 Site Completion**

Following remedial actions, steps must be followed to ensure that the cleanup methods are working properly. Once the remedy implemented is operational and functional and meets its designated environmental, technical, legal, and institutional requirements, the site status will be designated as a "site completion." Clean Closure may also need to be evaluated in accordance with 40 Code of Federal Register (CFR) 264 Subpart G.

This status has not been achieved for any sites at CAX to date.

### Operations and Maintenance

Once the remedial actions are completed, continuing site operation and maintenance (O&M) activities may be needed to maintain the effectiveness of the remedy and to ensure that no new threat to human health or the environment arises.

Operation and maintenance activities are dictated by the amount of hazardous substances remaining at the site after the completion of the remedial action. Resource Conservation and Recovery Act (RCRA) land disposal closure standards apply to waste removed from the site under CERCLA. If hazardous materials remain, post-closure groundwater monitoring is required. Only in those cases where no hazardous substances remain at a site and no residual groundwater contamination is present, is it possible to avoid groundwater monitoring. If the remedial action results in any hazardous substance remaining at the site, CERCLA, Section 121(c), requires review of such action at least every five years after the initiation of the remedial action. It is the installation's responsibility to ensure that this review is conducted and further action taken, if necessary.

In accordance with CERCLA, Section 121(c), if hazardous substances, pollutants, or contaminants remain at a site after the remedial action step, monitoring records will be reviewed to ensure that human health and the environment are being protected. The compliance review will be made every five years beginning with the initiation of the remedial action step until the remedy is no longer needed.

Many remedial technologies will require operation and maintenance of electro-mechanical equipment after the remedial action is installed. Structures and earthworks may require maintenance. Most sites that have hazardous substances remaining after the remedial action is installed will require periodic monitoring. Appropriate plans for these post-project activities will have been identified in the FS, ROD or decision document, detailed during remedial design, and implemented as appropriate.

Operation and maintenance of equipment will be an on-going process. Monitoring and recording data must also be continued. This will require monitoring reports and compliance review reports (DON, 1992).

### Site Closeout

The end point for all sites that enter the remedial action phase is closeout. A closeout is appropriate when no further response actions, under the IR Program are considered appropriate for the site. The methods for accomplishing a site closeout are discussed below for NPL sites and non-NPL sites.

### NPL Delisting

Section 300.425(e) of the NCP identifies the actions that must have been completed and the procedures to follow in deleting a site from the NPL. Sites having releases may be deleted from or re-categorized on the NPL, when no further response is appropriate.

Response actions and deletion procedures as they relate to DON sites are summarized as follows:

- 1) The USEPA regional office will be notified that appropriate response actions have been taken/completed and a request for site deletion from the NPL will be made.
- 2) The USEPA will consult with the state prior to developing the notice of intent to delete. In making a determination to delete a site from the NPL, the USEPA will consider, in consultation with the state, whether any of the following criteria has been met:
  - The DON and any other responsible parties have implemented all appropriate, required response actions.
  - No further response action by the DON and other responsible parties is appropriate.
  - The RI has shown that the release poses no significant threat to public health or the environment and, therefore, the taking of remedial measures is not appropriate.
- 3) Releases will not be deleted from the NPL until the state in which the release was located has concurred on the proposed deletion. USEPA provides the state 20 working days for review of the deletion notice prior to its publication in the Federal Register (FR).
- 4) Whenever there is a significant release from a site deleted from the NPL, the site will be restored to the NPL without application of the HRS.
- 5) To ensure public involvement during the proposal to delete a site from the NPL, the USEPA will perform the following:
  - Publish a notice of intent to delete in the FR and solicit comment through a public comment period for a minimum of 30 calendar days.
  - Publish a notice of availability of the notice of intent to delete in a major local newspaper of general circulation at or near the site that is proposed for deletion.
  - Place copies of information supporting the proposed deletion in the information repository, described in Section 300.430(c)(2)(iii) of the NCP, at or near the site proposed for deletion. These items shall be available for public inspection and copying.
  - Respond to each significant comment and any significant new data submitted during the comment period and include this response document in the final deletion package.
- 6) The USEPA will place the final deletion package in the local information repository once the notice of final deletion has been published in the FR.

Support of the above actions is accomplished by providing information to the USEPA and cognizant state during their review process, as well as for public notification and information purposes. Pertinent documents identified above will be placed in the information repository located near the site.

Sites that are deleted from the NPL are not designated as No Further Response Action Planned (NFRAP) sites.

#### Non-NPL Sites

The following steps will be performed for non-NPL sites.

- 1) Notify the USEPA regional office and the state that appropriate response actions have been taken/completed.
- 2) Prepare documentation showing that:
  - All appropriate, required response actions have been implemented.
  - No further response action is appropriate.
- 3) Designate the site or group of sites for which response actions have been taken/completed as NFRAP.
- 4) Ensure public notification by:
  - Placing the documentation to support the NFRAP in the information repository, described in Section 300.430(C)(2)(iii) of the NCP, at or near the site
  - Publishing a notice, to inform the public that the documentation to support a NFRAP is available in the information repository, in a major local newspaper of general circulation

Site closeout procedures established in Federal Facility Site Remediation Agreements negotiated with sites would be followed at installations where such agreements have been signed.

#### NPL Status of Cheatham Annex

On December 1, 2000, CAX was included on the NPL primarily due to the facility's proximity to wetlands and the potential impact on the surrounding environment. In 1999, the USEPA initiated HRS scoring of the Penniman facility. Roy F. Weston's Site Assessment Technical Assistance (SATA) Group collected shallow soil and sediment samples at various locations within the former facility. SATA selected the sample locations based on site reconnaissance and aerial photographic review. The findings of the investigation are summarized in the Final Site Inspection Narrative Report for the Penniman Shell Loading Plant (Weston, 1999). A HRS Documentation Record was forwarded to the Navy on February 3, 2000. The record was compiled on November 8, 1999, and revised January 3, 2000, and January 12, 2000 (USEPA, 2000). Surface water was the only pathway scored.

### 2.2.9 No Further Response Action Planned

The NCP states that sites that the USEPA determines need no additional evaluation are given a NFRAP designation within the CERCLA Information System (CERCLIS) as defined in Section 300.5 of the NCP. CERCLIS contains the official inventory of CERCLA sites and supports the USEPA's site planning and tracking functions. This designation means that no supplemental investigation or remediation work will be performed at the site(s) unless new information about the site(s) is presented indicating that the initial decision was not appropriate.

Decisions to recommend sites for NFRAP status or to proceed with site-specific response actions are integral to the execution of the IR Program and generally occur at one of four phases in the environmental response process. The decisions are reached on the basis of site or operable unit information, which is commonly organized in terms of hazardous substance sources, exposure pathways, and receptors. The NFRAP decision can be implemented upon completion of any of the following phases of the RI process: (1) the PA; (2) the SI; (3) the RI/FS; and (4) the removal action or remedial action phase.

NFRAP decision criteria are typically derived from statutory and regulatory provisions under Federal statutes, such as CERCLA and RCRA, as well as similar State statutes. In general, these statutes and regulations require that human health and the environment be adequately protected in the event of a release or threatened release of a hazardous substance. The following area designations along with other Federal and State criteria provide the foundation associated with the NFRAP decision:

- Areas of no suspected contamination
- Areas below action levels (ABALs) where no response or remedial action is required to ensure protection of human health and the environment
- Areas where remedies have been implemented/completed

The NFRAP decision is usually made on the basis of an SI, an ESI or an equivalent effort, if it can be shown that the levels of hazardous substances detected in a given area do not:

- Exceed media-specific action levels (e.g., chemical-specific applicable or relevant and appropriate requirements [ARARs] or risk-based concentrations [RBCs])
- Result in a non-carcinogenic hazard index (HI) above 1.0
- Result in a cumulative carcinogenic baseline site risk to an individual within the USEPA's acceptable risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ , using reasonable maximum exposure assumptions for either current or future land use
- Otherwise exceed applicable Federal or State requirements

A Draft Final NFRAP decision document for Site 9 – Transformer Storage Area was submitted in December 1999 (Baker, 1999a). No other sites at CAX have been designated for NFRAP status. The NFRAP evaluation process is shown on Figure 2-6.

### **2.3 Installation Restoration Program**

The purpose of the DON IR Program is to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at Navy and Marine Corps activities. The following discussion was extracted from the Navy/Marine Corps Installation Restoration Manual (DON, 1992).

Given the nature and extent of the operations at Navy and Marine Corps activities, the DON has been involved with toxic and hazardous materials for several decades. These materials, if released into the environment, could lead to significant damage of important natural resources upon which both man and nature depend. This potential has been recognized by the Department of Defense (DOD) and actions are being taken to ensure against future hazards from existing operations, as well as to cleanup previously disposed materials that pose real threats to the environment. Each of the DOD components, including the DON, is implementing an IR Program to address the hazardous waste site problems found on properties currently under its jurisdiction. The United States Army Corps of Engineers has been tasked to clean up sites that are no longer owned or used by the DOD Services. This program is known as the Formerly Used Defense Sites (FUDS) Program.

The DON has been actively engaged in the IR Program since 1980 and has taken an aggressive, proactive approach to the problem of hazardous waste sites found at Navy/Marine Corps installations. Site identification has taken place at virtually all Navy/Marine Corps installations and actions are either being taken or planned, to respond to those potential threats identified. In so doing, the DON is complying with both its legal obligations and its obligation to the community to protect public health, natural resources, and the environment.

The complex nature of the problems facing the DON in these efforts requires a carefully coordinated, interdisciplinary approach for their resolution. The DON IR Program requires coordination within the chain-of-command and encourages appropriate citizen involvement and coordination with non-DOD agencies.

#### **Scope of the IR Program**

CERCLA and SARA established a series of programs for the cleanup of hazardous waste disposal and spill sites nationwide. One of those programs, DERP, is codified in SARA Section 211 (10 United States Code [USC] 2701). The IR Program is a component of the DERP. DERP objectives, as stated in the law are:

- Identification, investigation, research and development, and cleanup of contamination from hazardous substances, pollutants, and contaminants
- Correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment
- Demolition and removal of unsafe buildings and structures, including buildings and structures of the DOD at sites formerly used by or under the jurisdiction of the Secretary of Defense.



The IR Program primarily addresses DERP's first two objectives for sites on currently owned installations. DERP and the IR Program are funded under a special transfer account, the Environmental Restoration Navy (ERN), which also is codified in SARA, Section 211 (10 USC 2703).

ERN funding can be used for corrective action at Solid Waste Management Units (SWMUs) under RCRA, as amended. RCRA provides for current and future hazardous waste management practices, as well as cleanup of past disposal sites at permitted or interim status Navy/Marine Corps installations.

The IR Program is not an all-encompassing environmental program. It focuses on the cleanup of contamination from past hazardous waste operations and past hazardous material spills. Specific eligibility criteria are:

- The IR Program is intended to address the cleanup of contamination and damage resulting from past activities.
- The IR Program is primarily intended to clean up hazardous substances. It may address any pollutant and/or contaminant which endangers public health, welfare, or the environment, including petroleum, oil, and lubricant (POL) products and supports research associated with unexploded ordnance detection and range clearance.
- The IR Program addresses both NPL sites and non-NPL sites
- The IR Program includes sites on DON-controlled properties, or any off-base area contaminated by the migration of hazardous substances from DON-controlled property, and which are in the United States, its territories, or possessions.

Significant impacts on the DON IR Program resulting from the passage of SARA and issuance of DOD CERCLA/SARA policy guidance are:

- CERCLA/SARA and related regulations became statutory requirements.
- Terminology and procedures for the IR Program were changed to match those given in the NCP.
- The USEPA and states were given broader authority to review, comment, and, in some instances, approve key IR Program documents and decisions.
- SARA established specific reporting requirements, schedules for Federal agencies to complete certain actions, and timetables via a Federal Facilities Agreement (FFA) with governing agencies. (CAX is not operating under a FFA)

On August 14, 1981, in Executive Order 12316, the President delegated certain authority specified in CERCLA to the Secretary of Defense. The current DOD IR Program policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated December 11, 1981. DEQPPM 81-5 reissued and amplified all previous directives and memoranda regarding the IR Program. To fulfill the requirements imposed by DOD's IR Program, the DON initiated its program, entitled Navy Assessment and Control of Installation Pollutants (NACIP). The Navy formerly managed this program in three phases: IAS, Confirmation Study, and Remedial Action. In response

to SARA, the Navy changed the terminology and structure of the IR Program to conform to that used by USEPA.

The IAS identifies potential threats to human health or the environment caused by past hazardous substance storage, handling, or disposal practices as a result of Naval activities. The IAS is equivalent to a PA conducted by USEPA under the Superfund Program.

The three-step Confirmation Study, outlined below, analyzed contaminants present at sites of concern and evaluated contaminant migration.

- In Step IA (verification), short-term analytical testing and monitoring determine whether specific toxic and hazardous materials identified in the IAS are present in concentrations considered to be hazardous. If required, Step IB (characterization) uses longer-term testing and monitoring to provide more detailed information concerning the extent and rate of contaminant migration, site hydrogeology, and other factors. The sum of Steps IA and IB (verification and characterization) equivalent to an RI.
- If the RI indicates that remedial actions are necessary, a FS is needed to evaluate alternatives that will achieve compliance with environmental standards. The FS, referred to as Step II, also includes projection of the effectiveness of the alternatives and preparation of cost estimates.
- If deemed necessary after the RI or SI, as discussed below, Step III (remedial action) includes preparation of plans, specifications, and government project documentation with cost estimates satisfactory for project funding requests. Step III includes the required corrective measures to mitigate or eliminate confirmed problems.

However, for certain sites where the results from Step IA indicate that a Step IB characterization is required for only limited additional or expanded sampling/monitoring, then the sum of Step IA and Step IB is referred to as the SI. For example, an SI would be implemented for a site that contains areas where certain contaminants were detected in relatively low concentrations in limited areas (e.g., a site that is not or would not, based on available data and site history, be a candidate for inclusion on the USEPA NPL).

In addition, Step II, which occurs after Steps IA and IB of the SI process, consists of recommendations for further action, including remedial action, if any, depending on the results of the SI and on a comparison of the data with ARARs.

Initially, investigations at CAX were conducted under the three-step confirmation process. For example, Sites 1, 9 and 11 were investigated under a Step 1A Confirmation Study, Rounds 1 and 2 (Dames and Moore, 1986 and 1988). The results of this investigation are summarized in Section 3.0.

**SECTION 2.0**  
**FIGURES**

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FIGURE 2-1

CERCLA PROCESSES  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

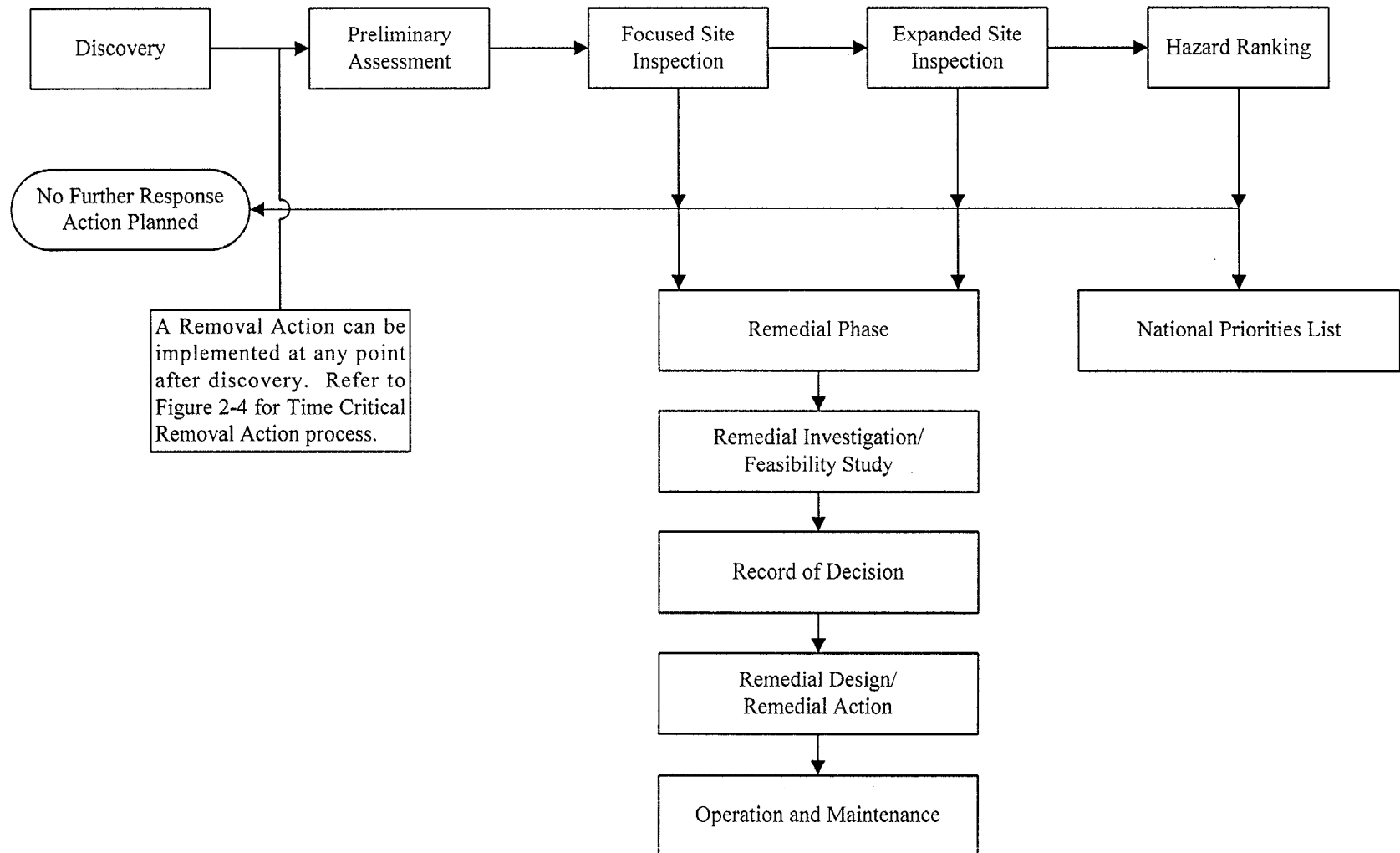


FIGURE 2-2

**SITE INSPECTION PROCESS  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

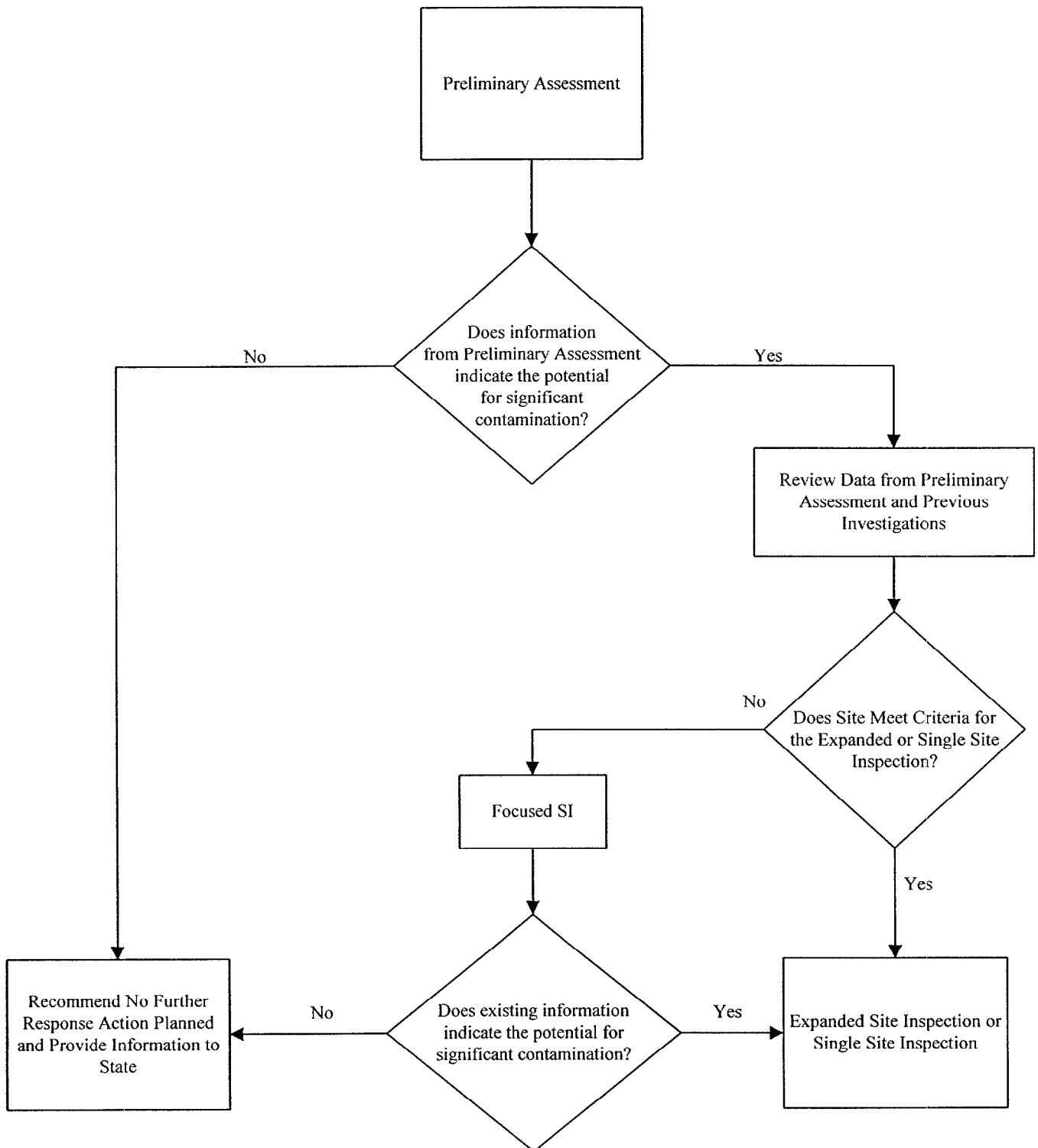
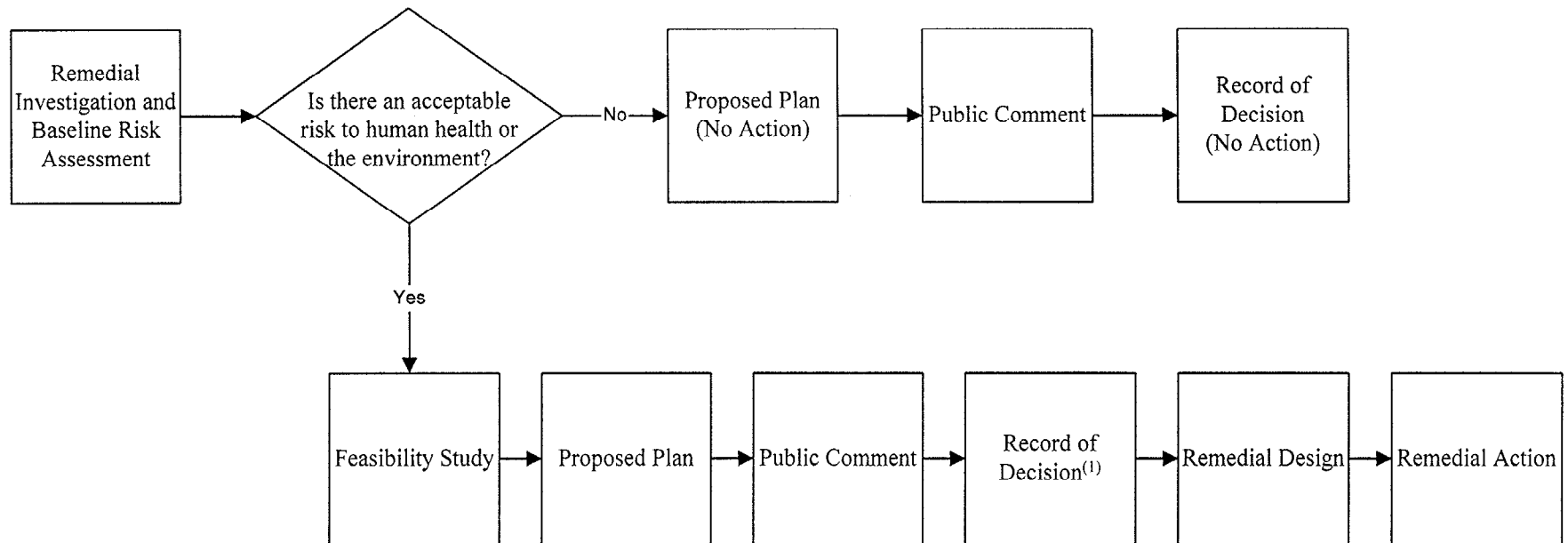


FIGURE 2-3

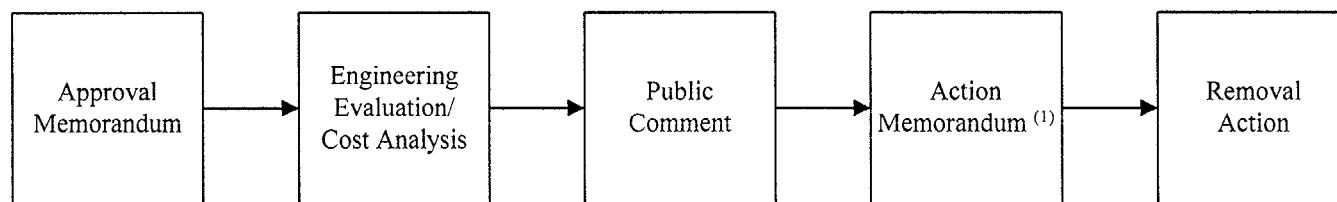
REMEDIAL INVESTIGATION/FEASIBILITY STUDY PROCESS  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



<sup>(1)</sup> Includes summary of any Interim Remedial Actions or Removal Actions for the site(s)

FIGURE 2-4

**NON-TIME CRITICAL REMOVAL ACTION PROCESS  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**



<sup>(1)</sup> Includes Responsiveness Summary to Public Comment

FIGURE 2-5

INTERIM REMEDIAL ACTION PROCESS  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

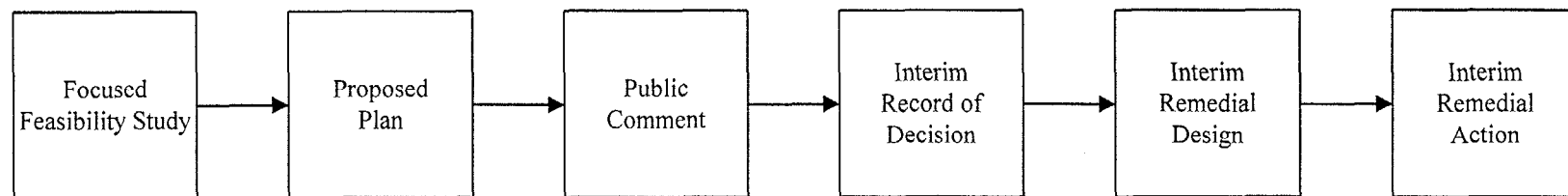
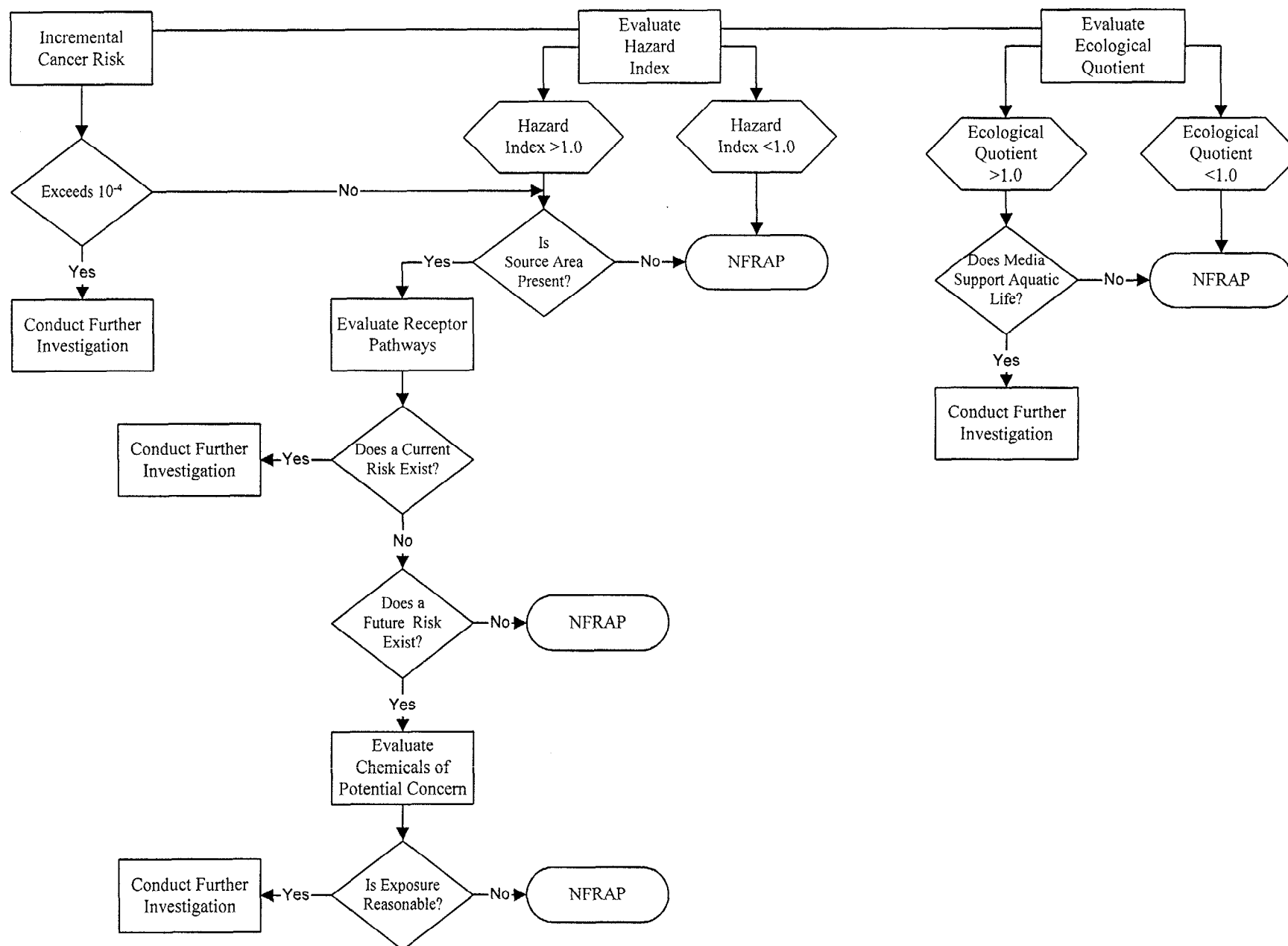




FIGURE 2-6

NO FURTHER RESPONSE ACTION PLANNED  
EVALUATION DIAGRAM  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



### **3.0 INSTALLATION RESTORATION PROGRAM ACTIONS AND INVESTIGATIONS**

This section presents a history of the IR Program at CAX and summarizes IR investigations and activities that have been conducted to date and the screening-level ecological risk assessment to be conducted at Site 1 in FY 2001. Detailed descriptions of site conditions and findings/results of investigations are presented in Section 4.0.

#### **3.1 Previous Investigations and Studies at Cheatham Annex**

The following environmental investigations/studies have been conducted to date at CAX:

- IAS of Naval Supply Center, Cheatham Annex and Yorktown Fuels Division. February 1984. NEESA.
- Confirmation Study, Step 1A (Verification), Round One, June 1986. Dames and Moore.
- Confirmation Study, Step 1A (Verification), Round Two. June 1988. Dames and Moore.
- Draft RI Interim Report. March 1989. Dames and Moore.
- Final RI Interim Report. February 1991. Dames and Moore.
- Final Site Investigation for Sites 1, 10, and 11. November 1994. Roy F. Weston.
- Final Site Screening Process Report, Sites 1, 10, and 11. September 1997. Baker.
- Aerial Photographic Analysis (EPIC). USN Supply Center - Cheatham Annex, Williamsburg, Virginia. United States Environmental Protection Agency Region III. May 1998.
- Shoreline Assessment Letter Report (Site 1). August 1998. Baker
- Recommendations for Erosion Mitigation Measures Letter Report (Site 1). May 1999. Baker.
- Final Field Investigation Report Site 1 and AOC 2. September 1999. Baker.
- Final Action Memorandum - TCRA – Site 1. August 1999. Baker.
- Final Site Inspection Narrative Report , Penniman Shell Loading Plant. August 1999. USEPA/Weston
- Final Data Acquisition/Summary Report, Penniman Shell Loading Plant. October 1999. USEPA/Weston
- Draft Final NFRAP Decision Document for Site 9 - Transformer Storage Area. December 1999. Baker
- HRS Documentation Record, Naval Weapons Station Yorktown (Cheatham Annex). Last revision January 12, 2000. USEPA

- Draft Removal Closeout Report, Site 11 – Bone Yard. April 2000. Baker
- Final Construction Closeout Report – Site 1 Time Critical Removal Action. June 2000. Baker
- Draft Pond Study Report. July 2000. Baker
- Draft Final Remedial Investigation Report for Site 1 – Landfill Near Incinerator. August 2000. Baker
- Draft Final Site Inspection Report, Site 4 and AOC 1. September 2000. Baker
- Draft Final Field Investigation Report, Site 7 and AOC 2. October 2000. Baker
- Draft Focused Feasibility Study for Site 1 – Landfill Near Incinerator. November 2000. Baker

To date, environmental samples have been collected from Sites 1, 4, 7, 9, 10, 11, and AOC 1 and AOC 2. Sampling programs are summarized in Section 4.0.

### **3.1.1 Initial Assessment Study**

The purpose of the IAS was to identify and assess sites posing a potential threat to human health or the environment due to contamination from past operations. A total of 12 sites were considered in the study including:

- Site 1 - Landfill near Incinerator
- Site 2 - Contaminated Food Disposal Area
- Site 3 - Submarine Dye Disposal Area
- Site 4 - Medical Supplies Disposal Area
- Site 5 - Photographic Chemicals Disposal Area
- Site 6 - Spoiled Food Disposal Area
- Site 7 - Old DuPont Disposal Area
- Site 8 - Landfill near Warehouse 14
- Site 9 - Transformer Storage Area
- Site 10 - Decontamination Agent Disposal Area near First Street
- Site 11 - Bone Yard
- Site 12 - Disposal Site near Water Tower

Four potentially contaminated sites were identified based on information from historical records, aerial photographs, field inspections, and personnel interviews. Each site was evaluated for the type of contamination, migration pathways, and pollutant receptors. The four identified sites were recommended for confirmation study and included:

- Site 1 - Landfill near Incineration
- Site 9 - Transformer Storage Area
- Site 10 - Decontamination Agent Disposal Area near First Street
- Site 11 - Bone Yard

### **3.1.2 Confirmation Studies**

The Confirmation Studies were conducted by Dames & Moore in two rounds. During the first round of sampling, conducted in the winter of 1986, environmental samples were collected from the four sites (Sites 1, 9, 10, and 11) identified in the IAS. This effort was documented in the report Confirmation Study Step IA (Verification), Round One, submitted to LANTDIV June 11, 1986. The first round of work at these four sites included the installation of five new monitoring wells and the collection and analysis of groundwater samples. Groundwater samples were also collected from four existing monitoring wells installed for landfill closure at Site 1. This effort also involved the collection and analysis of three surface water samples plus bottom sediment samples from the same locations. Twenty-two surface soil samples were also collected and analyzed. The Transformer Storage Area (Site 9) was taken off the list based on the results of the sampling completed during Round One of the Confirmation Study. Additional investigations were recommended for the three remaining sites (Sites 1, 10, and 11) under the Confirmation Studies.

The second round of sampling for the Confirmation Study was conducted during November and December 1987. The Round Two effort for the three sites included the collection and analysis of nine groundwater samples (Sites 1 and 11), and three surface water and three sediment samples (Site 11). The results of the analyses performed on these samples and comparisons with applicable regulatory standards were presented in the report Confirmation Study Step IA (Round Two), submitted to LANTDIV June 20, 1988. No recommendations were presented.

### **3.1.3 Remedial Investigation Interim Report**

A Draft RI Interim Report prepared by Dames & Moore was submitted to LANTDIV in March 1989. The report was finalized by Dames & Moore and submitted in February 1991 under Environmental Science and Engineering, Inc. (ESE) cover (Dames & Moore, 1991). The purpose of the RI Interim Report was to summarize available data for Sites 1, 9, 10, and 11 and, based on the data, provide recommendations for additional efforts to be conducted to complete the RI. The recommendations included aerial photographic interpretation, an off-Base well inventory, limited biota sampling, and background sampling of soil, surface water, and sediment. Site-specific recommendations included collection of groundwater samples from Site 1, historical aerial photographic interpretation to gather information regarding disposal activities at Site 10, and collection of groundwater, surface water, sediment and soil samples from Site 11.

### **3.1.4 Site Investigation Report for Sites 1, 10, and 11**

In July/August 1992, Roy F. Weston, as a subcontractor to Baker, conducted additional field activities at Sites 1, 10, and 11. These activities included well installation, a soil gas survey, and collection and analysis of soil, groundwater, surface water, and sediment samples. Results of this investigation are presented in the Final Site Inspection Report for Sites 1, 10 and 11 (Weston, 1994).

The recommendations presented in the SI included limited actions as follows:

- Site 1 – Re-sampling of monitoring wells for volatile organic compounds (VOCs) and dissolved (filtered) metals and performance of a file search of past records to verify closure status of the landfill.
- Site 10 – Re-sampling of monitoring wells for VOCs and dissolved (filtered) metals.

- Site 11 – Re-sampling of shallow soils for VOCs, re-sampling of monitoring wells for VOCs and dissolved (filtered) metals, and re-sampling of surface water for VOCs.

### **3.1.5 Site Screening Process Report for Sites 1, 10, and 11**

In August 1997, Baker collected groundwater samples from the existing monitoring wells at Sites 1, 10, and 11. The samples were analyzed for Target Compound List (TCL) volatiles, semivolatiles, pesticides/polychlorinated biphenyls (PCBs), and Target Analyte List (TAL), metals - total and dissolved.

As part of the Site Screening Process (SSP), human health and ecological risk screening was performed to determine whether contaminants detected in environmental media pose unacceptable risks to human receptors and/or the environment. The risk screening process was completed in accordance with the SSP Guidelines (Baker, 1994).

Following is a summary of the conclusions/results that were presented in the SSP Report for each site.

#### Site 1 - Landfill near Incinerator

- Based on the available analytical data, no unacceptable human health or ecological risks are posed by the site.
- Based on the available analytical data, no additional investigation or remedial action is warranted.
- The soil cover of the landfill should be maintained - trees, that are growing through the cover should be removed.
- Monitoring wells that penetrate the landfill should be abandoned to eliminate a future potential pathway of contaminants from the fill material.

#### Site 10 – Decontamination Agent Disposal Area near First Street

- No unacceptable human health or ecological risks are posed by the site.
- No additional investigation or remedial action is warranted.

#### Site 11 - Bone Yard

- Risks to human health were generally within acceptable ranges.
- Ecological risks were primarily associated with deep sediments (in Penniman lake) that would not be contacted by aquatic ecological receptors.
- No additional investigation or remedial action is warranted.

This document was finalized prior to receipt of VDEQ comments. These comments were discussed with LANDTIV and VDEQ at a meeting conducted May 12, 1999, and will be considered in preparation of subsequent documents for the IR Program at CAX.

### 3.1.6 Aerial Photographic Analysis

The Aerial Photographic Analysis report presents the results of an analysis of historical aerial photographs of CAX. Nine dates of black-and-white and color infrared photographs (1937, 1942, 1955, 1960, 1963, 1969, 1975, 1989, and 1998) were used to analyze the site. Environmentally significant hazardous waste-related features and conditions were identified. The purpose of the report was to provide remote sensing support to field investigations for USEPA Region III under CERCLA.

Seven of the 12 IAS sites were located and documented in the report. The remaining five IAS sites were not located due to lack of visible features on the photographs. The following is a list of IAS sites. Those denoted with an asterisk were located and significant features and changes observed in these areas were documented.

- Site 1 - Landfill near Incinerator\*
- Site 2 - Contaminated Food Disposal Area\*
- Site 3 - Submarine Dye Disposal Area\*
- Site 4 - Medical Supplies Disposal Area\*
- Site 5 - Photographic Chemicals Disposal Area
- Site 6 - Spoiled Food Disposal Area
- Site 7 - Old Dupont Disposal Area
- Site 8 - Landfill near Warehouse 14\*
- Site 9 - Transformer Storage Area
- Site 10 - Decontamination Agent Disposal Area near First Street
- Site 11 - Bone Yard\*
- Site 12 - Disposal Site near Water Tower\*

It should be noted that the IAS "Sites" are identified as "Areas of Concern" in the Aerial Photographic Analysis Report. There is no mention of AOC 1 (Scrap Metal Dump) or AOC 2 (Dextrose Dump). Observations for each site are summarized in Table 3-1.

#### Areas of Concern

A total of five AOCs have been identified at CAX, including:

- AOC 1 – Scrap Metal Dump
- AOC 2 – Dextrose Dump
- AOC 3 – CAD 11/12 Pond Bank
- AOC 4 – IR Site 4 – Medical Waste Disposal Area
- AOC 5 – Debris Area

These AOCs were identified during site visits by LANTDIV, USEPA, and VDEQ representatives in 1998.

AOC 3 is comprised of an approximately 20 foot by 20 foot by 10 foot high pile of metal banding, a few empty drums, and other miscellaneous debris present along the pond bank between buildings CAD 11 and 12. This AOC is adjacent to AOC 4/Site 4. AOC 4 is one in the same as Site 4.

AOC 5 is the metal debris pile along the northern perimeter of Site 1 and consists of automobiles, boat parts, metal cables, etc. AOC 5 is currently being managed as part of Site 1.

The Aerial Photographic Analysis report does not refer to any of the five AOCs by name, but does provide observations for the area that AOC 1 (Scrap Metal Dump) occupies as presented on Table 3-1.

### **3.1.7 Shoreline Assessment Letter Report**

The August 14, 1998 Shoreline Erosion Assessment Letter Report (Baker, 1998) was prepared to address the erosion of the bank of the York River in the vicinity of Site 1. The assessment concluded that the erosion of the river bank is attributable to high water levels and wave action. The erosion is increased by factors such as wind, poor vegetation, and the presence of large trees along the top of the bank. As an interim measure, Baker recommended clearing trees within a distance of approximately two bank-heights (i.e., approximately 50 feet) from the toe of the slope, and establishing low-growing vegetation. The long-term solution entails cutting the slope back to 2 horizontal (H) to 1 vertical (V) and installing a stone revetment at the toe of the slope.

### **3.1.8 Recommendations for Erosion Mitigation Measures Letter Report (Site 1)**

On March 15, 1999, during a Baker visit to inspect the progress of clearing activities at Site 1, an approximately 60-foot section of the landfill perimeter was noted to be partially exposed and a minor amount of apparent landfill debris was noted on the beach in the vicinity of the erosion. To address this erosion, LANTDIV tasked Baker to provide recommendations for mitigation of the erosion. Following is a summary of recommendations that were presented in the letter report dated May 6, 1999 (Baker, 1999b):

- Install a sand-filled Geotube revetment along the eroding area.
- Characterization and disposal of the debris that has collected on the beach area as well as the small container of yellow residue outcropping from the bank.
- Implement a program to routinely inspect the landfill perimeter.
- Develop strategies for the long-term management of the landfill.

### **3.1.9 Field Investigation Report – Site 1 and AOC 2**

A field investigation was conducted at Site 1 and AOC 2 in October 1998. The findings of the investigation are documented in the Field Investigation Report and discussed further in Section 4.0. The Final version of this document was submitted September 7, 1999 (Baker, 1999c).

For Site 1, the Field Investigation Report recommended the following:

- Remove surficial debris that has collected on the flat, inter-tidal beach area in the vicinity of the eroding bank.
- Develop and implement interim measures that can be quickly installed to mitigate erosion in the 60-foot stretch of shoreline where the landfill is being undermined. (Baker developed recommendations for the interim erosion control measures for the small area of exposed debris at Site 1 in the letter report submitted May 6, 1999). The recommendations included use of sand-filled geotextile tubes as a shoreline revetment. Construction should be implemented as a TCRA. The proposed TCRA construction activities are planned for fall/winter 1999 and are documented in the Final Action Memorandum for the TCRA (Baker, 1999b).
- Institute a periodic inspection program so that the condition of the slope can be monitored and documented.

- Consider abandoning monitoring wells 1GW01, 1GW02, 1GW03, 1GW04, and 1GW07 due to the installation of these monitoring wells through the landfill and/or monitoring well integrity.
- Develop and implement solutions for long-term management of the landfill.

The Field Investigation for AOC 2 consisted of a geophysical survey and soil and groundwater investigations including installation of temporary monitoring wells. VOCs, pesticides and inorganics were detected in the soil samples at low levels. Semivolatile organic compounds (SVOCs) and inorganics were detected in groundwater samples at low levels. The presence of these constituents was not suspected to be related to site activities.

The Field Investigation Report recommended that the sources of the geophysical anomalies and potential sources of contamination be identified by excavating a total of six shallow test pits in the vicinity of the most significant anomalies detected.

### **3.1.10 Site Inspection Narrative Report for the Penniman Shell Loading Facility**

In January 1999, Weston/USEPA performed a site investigation which included collection of soil, sediment, surface water, and waste samples. The purpose of the investigation was to assess potential sources of contamination associated with the Penniman Facility and determine the need for additional investigation. The data would also be available to support HRS evaluations.

A total of 29 samples were collected including fourteen waste source samples, two surface water samples, one drinking water sample, nine sediment samples, and three background samples.

The report concluded that six inorganic compounds and one nitroaromatic compound were present at levels exceeding USEPA Region III Risk-Based Concentrations (RBCs) in waste source samples. Four of these constituents (cadmium, chromium, lead, and magnesium) were detected in sediment and surface water samples at levels which indicate a release. Several areas of potential concern associated with remnant waste materials from the Penniman loading operations were noted. Based on the findings of the site investigation, additional sampling of groundwater, waste materials, soil, treated drinking water, surface water and sediment, along with performance of a human health risk assessment was recommended. The final report was submitted August 1999 (Weston, 1999a).

### **3.1.11 Data Acquisition/Summary Report, Penniman Shell Loading Plant**

The purpose of the Data Acquisition/Summary Report was to compile and combine all available information regarding the Penniman Shell Loading Plant into a useable format. The report was finalized in October 1999 (Weston, 1999b).

### **3.1.12 1999 Field Investigation**

In November 1999 a Field Investigation was performed at Site 1 - Landfill Near Incinerator, Site 4 - Medical Supplies Disposal Area, Site 7 - Old DuPont Disposal Area, Site 11 - Boneyard, AOC 1 - Scrap Metal Dump, and AOC 2 - Dextrose Dump. Results from the investigation are summarized by site/AOC in Sections 3.1.17 through 3.1.20.



### **3.1.13 HRS Documentation**

USEPA prepared a HRS Documentation Record (PRE Score) for CAX. The document was sent to the Navy February 3, 2000. The completion date was November 8, 1999, with revisions on January 3, 2000, and January 12, 2000. Surface water was the only pathway included in the scoring. The HRS site score for CAX was 48.72.

### **3.1.14 Draft Removal Closeout Report Site 11 – Bone Yard**

This Closeout Report (Baker, 2000a) summarizes removal activities that have occurred at Site 11 – Bone Yard. In November 1999, Baker conducted confirmatory sampling at Site 11 at the request of VDEQ. A RI/FS has been discussed among representatives from the Navy, VDEQ, and USEPA. This effort (which has not been funded) will compile all existing data, fill data gaps, and include a human health risk assessment. The RI will provide recommendations regarding the need for additional actions at the site. The FS will select and describe the appropriate actions for the site. A screening-level ecological risk assessment is also planned for Site 11 and will have to be completed before RI recommendations can be formulated.

### **3.1.15 Final Construction Closeout Report - Site 1 Time Critical Removal Action**

This report summarizes the construction activities associated with the TCRA performed at Site 1-Landfill near Incinerator (Baker, 2000b). The TCRA for Site 1 was conducted to remove the debris that had collected on the beach area and to temporarily stabilize the toe of the bank in the erosion area. Toe stabilization was accomplished by installation of three sand-filled geotextile tubes. The TCRA was implemented to stabilize the site until the long-term solution for the management of the Site 1 landfill is implemented. A Final Action Memorandum for the TCRA was prepared by Baker in August 1999.

### **3.1.16 Draft Pond Study Report**

This report summarizes a field investigation conducted in April 2000 to support future screening-level ecological risk assessments (ERAs) that will be performed at CAX during FY 2001 (Baker, 2000c). During this investigation, surface water and sediment samples were collected from four water bodies at CAX. The samples were collected from the following water bodies: Cheatham Pond, Jones Pond, Youth Pond, and Penniman Lake. Preliminary results from this investigation identified the following:

- The ecological risk screening conducted on surface water and sediment analytical data for the four ponds identified several inorganic and organic chemicals that were detected at concentrations exceeding Biological Technical Assistance Group (BTAG) and CH2M Hill screening levels.
- The human health screening identified inorganics in surface water exceeding tap water RBCs times ten and several organics and inorganics in sediment at concentrations exceeding residential soil RBCs.

### **3.1.17 Draft Final Remedial Investigation Report for Site 1 – Landfill Near Incinerator**

This report presents the results of the RI that was conducted at Site 1 – Landfill Near Incinerator (Baker, 2000d). Data evaluation for this RI Report included soil samples from 1999 and soil and groundwater samples from 2000, as well as soil samples from 1992, and soil, surface water and sediment samples from 1998. Results of the investigation show that the landfill contains a variety of wastes that are both non-hazardous and hazardous by characteristic. The analytical data presented show that samples of landfilled material exhibit the presence of polyaromatic hydrocarbons (PAHs), pesticides, PCBs, and inorganic compounds, particularly copper and lead. The data shows evidence suggesting the landfill has impacted the surrounding environment to a limited extent. The RI Report made the following recommendations.

- A feasibility study should be conducted at Site 1.
- Remediation at Site 1 should focus on the elimination of exposure of future receptors to landfilled materials, removal of surface debris, and to prevent erosion of landfilled materials along the banks of the York River and unnamed tributary.
- The debris pile should be surveyed and inventoried. Some materials may be sold as scrap, which could offset some of the cost for removal.
- An ecological risk assessment for Site 1 will be conducted as a stand alone document.

### **3.1.18 Draft Final Site Inspection Report, Site 4 and AOC 1**

In November 1999, Baker performed a site inspection that included collection of soil and sediment at Site 4 and soil, surface water, and sediment at AOC 1. The findings of the investigation are documented in the Draft Final Site Inspection Report (Baker, 2000e) and discussed further in Section 4.0.

For Site 4, the Site Inspection Report recommended the following:

- Implement an inspection program that includes periodic site visits with perimeter walks to locate medical supplies within and around Youth Pond and the York River shoreline.
- Install inlet protection controls to prevent medical supplies from entering the culvert that flows from the upstream pond to Youth Pond.
- Perform a limited investigation to define the lateral extent of debris at the site.
- Complete an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the most appropriate means of removing or covering the debris that is present at the site.

For AOC 1, the Site Inspection Report recommended the following:

- Perform a limited investigation to evaluate disposal parameters.

- Complete an EE/CA to evaluate the most appropriate means of removing or covering the debris that is present at the site.
- Review treatment plant effluent and analytical requirements to verify that fluoranthene, ethylbenzene, xylene, and Aroclor-1260 are not present in unacceptable levels in either the distributed water or the effluent.

### **3.1.19 Draft Final Field Investigation Report, Site 7 and AOC 2**

This Field Investigation Report summarizes the November 1999 Field Investigation activities that were conducted at Site 7 and AOC 2. The purpose of the Field Investigation was to collect data necessary to gain a better understanding of the nature and extent of possible contamination at Site 7 and AOC 2. The findings of the investigation are documented in the Draft Final Field Investigation Report (Baker, 2000f) and discussed further in Section 4.0.

For Site 7, the Field Investigation Report recommended the following:

- Perform an expanded investigation to determine the lateral extent and chemical characteristics of the buried debris. The investigation should include determination on the source of PCB contamination and characterization of soil, groundwater, and sediment.
- An unexploded ordnance (UXO) specialist should be on site for any future intrusive investigative activities planned for Site 7.
- Once the site has been more fully characterized, an EE/CA should be completed to determine the appropriate management strategy for the site (e.g., removal, capping, monitoring, no action, etc.)

During a site visit by representatives from the Navy and USEPA in August 2000, a fourth location for the disposal area was discovered. At this time, concrete and metal surface debris was found in the wooded area between the recreational cabins and the York River. Debris was also found along a portion of the shoreline of the York River. Based on the location and type of debris found in this area (e.g., pieces of charred, melted glass and engine parts from the World War I era), it is believed that this fourth location is in fact the site that received wastes from Penniman and the DuPont Facility. This area has been designated Site 13 (Penniman Disposal Area) and will be addressed under a separate investigation.

For AOC 2, the Field Investigation Report recommended the following:

- Conduct a limited geophysical investigation to delineate the lateral extent of buried respirator cartridge canisters and locate the eastern perimeter of disposal along "Deer Pit" Road. Conduct a test pit investigation to confirm the results of the geophysical investigation.

### **3.1.20 Draft Focused Feasibility Study for Site 1 – Landfill Near Incinerator**

This report presents the Focused Feasibility Study completed for Site 1 – Landfill Near Incinerator (Baker, 2000g). The purpose of the Focused FS for Site 1 is to identify remedial action alternatives (RAAs) that are protective of human health and the environment, and that cost-effectively attain appropriate Federal and state (Commonwealth) requirements. A focused FS, which would focus on a limited number of remedies for the surface soil remediation at the site, was agreed upon by the

WPNSTA Yorktown Partnering Team. The area of concern at Site 1 from a human health risk perspective is the soil inside the landfill. From this perspective, the following three RAAs were developed for Site 1.

- RAA 1: No action.
- RAA 2: Shoreline erosion control, surface debris removal, and soil cover.
- RAA 3: Surface debris removal and excavation with off-site disposal.

### **3.2 Administrative Record for Cheatham Annex**

The Administrative Record files for CAX are available for public review at the Newport News Public Library (Virgil I. Grissom Branch). Baker has converted the AR files into an electronic database. Compact disks (CDs) containing the final version of the electronic database were submitted to LANTDIV on November 22, 2000. A list of the reports contained in the Administrative Record is presented in Table 3-2. The table does not include letters or newspaper/magazine clippings that are included in the Administrative Record files. A public declaration of the availability of the administrative record files was published in the July 17, 1999 Newport News Daily Press newspaper.

### **3.3 Ecological Risk Assessment**

Ecological concerns at all IR sites at CAX must be addressed before long-term plans can be finalized. During FY 2001, these concerns will begin to be addressed by compiling existing analytical data and preparing a screening-level ERA for Sites 1, 4, 9 and 11 in accordance with the 1997 USEPA document entitled Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final and 1999 Chief of Naval Operations (CNO) document entitled Navy Policy for Conducting Ecological Risk Assessments.

Under this screening-level ERA, Step 1 of the USEPA and CNO ERA guidance (screening-level problem formulation and ecological effects evaluation) will be completed. The screening-level problem formulation will involve the development of a preliminary conceptual model. As part of the problem formulation, potential exposure pathways and ecological receptors will be evaluated and identified. The screening-level ecological effects evaluation will involve the identification of chemical exposure levels that represent conservative threshold screening values (i.e., BTAG screening values for soil, surface water, and sediment and No Observed Adverse Effect Levels [NOELS] for upper trophic level receptors). The BTAG screening values will include alternate values developed by CH2M HILL for Naval Airforce Base (NAB) Little Creek. For those chemicals lacking BTAG screening values developed by CH2M HILL, an attempt will be made to develop a screening value using literature-based information. Prior to their use in the screening-level ERA, BTAG will be contacted for approval.

Step 2 of the USEPA and CNO guidance (screening-level preliminary exposure estimate and risk calculation). The screening-level exposure estimate will define the exposure point concentration that will be used to evaluate potential risks, as well as the development and identification of dietary intake models for upper trophic level receptors. The screening-level risk calculation will involve the identification of ecological chemicals of potential concern (ecological COPCs). For a given complete exposure pathway, a chemical will be identified as an ecological COPC if it has a Hazard Quotient (HQ) value greater than 1.0 or if it lacks a threshold screening value.

In April 2000, a field investigation was conducted in order to support future screening-level ERAs that will be performed at CAX during FY 2001. During this investigation, surface water and sediment samples were collected from four water bodies at CAX. The samples were collected from the following water bodies: Cheatham Pond, Jones Pond, Youth Pond, and Penniman Lake. Preliminary results from this investigation identified the following:

- The ecological risk screening conducted on surface water and sediment analytical data for the four ponds identified several inorganic and organic chemicals that were detected at concentrations exceeding BTAG and CH2M Hill screening levels.
- The human health screening identified inorganics in surface water exceeding tap water RBCs times ten and several organics and inorganics in sediment at concentrations exceeding residential soil RBCs.

**SECTION 3.0**  
**TABLES**

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TABLE 3-1

**SUMMARY OF AERIAL PHOTOGRAPHIC ANALYSIS OBSERVATIONS  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN VIRGINIA  
CHEATHAM ANNEX SITE**

<b>Date of Photograph</b>	<b>Observation</b>
<b>Site 1 - Landfill near Incinerator</b>	
April 17, 1937	No observation regarding Site 1.
October 1, 1942	Visible adjacent to small tributary. Solid waste visible on both banks of the tributary.
November 21, 1955	Light- and dark-toned solid waste are visible.
June 27, 1960	The areal extent has increased compared to 1955. Dark-toned material is present.
April 3, 1963	The areal and vertical extent of solid waste is larger compared to 1960.
May 13, 1969	Additional solid waste has been deposited at the site and the areal extent has increased since 1963.
October 23, 1975	Site is partially revegetated, indicating inactivity since 1969.
March 17, 1989	The areal extent of the landfill has increased since 1975 and one small dark stain is present.
January 1, 1998	The site is partially revegetated. Two small areas of standing liquid are present on the bare soil portion of the old landfill.
<b>Site 2 - Contaminated Food Disposal Area</b>	
November 21, 1955	Consists of a revegetated mound and a trench.
May 13, 1969	Consists of revegetated mounded material and bare soil that appears to be a filled trench.
<b>Site 3 - Submarine Dye Disposal Area</b>	
October 23, 1975	Dark-toned material and staining are present
March 17, 1989	Dark-toned material is present
<b>Site 4 - Medical Supplies Disposal Area</b>	
June 27, 1960	Probable disposal area. No revegetation has occurred since 1955 indicating probable continued use of the area for waste disposal.
April 3, 1963	Revegetation has not occurred since 1960, possibly indicating continued waste disposal. Dark-toned material noted at the site.
May 13, 1969	Area now revegetated indicating that probable waste disposal activities ceased between 1960 and 1969.
<b>Site 7 - Old DuPont Disposal Area (EPIC Study Location)</b>	
April 17, 1937	No visual evidence of a disposal area is observed in the area in which the site was suspected to be located (along the York River). However a large possible dump is located adjacent to Queen Creek. An access road leads from the Penniman plant to the possible dump. IR Site 7 is the site along the York River. The possible dump along Queen Creek has not been identified as an IR site.

**TABLE 3-1 (Continued)**

**SUMMARY OF AERIAL PHOTOGRAPHIC ANALYSIS OBSERVATIONS  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN VIRGINIA  
CHEATHAM ANNEX SITE**

<b>Date of Photograph</b>	<b>Observation</b>
<b>Site 7 – Old DuPont Disposal Area (Current Site Location)</b>	
November 21, 1955	Shown as an extensive excavation with partial revegetation.
June 27, 1960	Excavation still visible.
April 3, 1963	Excavation still visible.
May 13, 1969	Excavation larger than 1963.
October 23, 1975	Revegetated.
<b>Site 8 – Landfill near Building CAD 14</b>	
April 3, 1963	A small access road leads northwest from Building 14 to a shallow trench filled with liquid. Excavated soil is also present
May 13, 1969	Trench no longer present.
<b>Site 11 – Bone Yard</b>	
November 21, 1955	A small enclosure and several unidentified objects are noted. Drainage flows to Penniman Lake where a small excavation is noted.
June 27, 1960	Enclosure still present. Bare soil now present along with a small area of disturbed ground.
April 3, 1963	A stain and two deposits of solid waste are noted. Another possible waste disposal area is seen south of the site in a wooded area at the end of an access road.
May 13, 1969	Possible drums, associated stains and standing liquid are noted.
October 23, 1975	Partially revegetated and apparently inactive.
March 17, 1989	Possible drums, associated stains and standing liquid are noted.
January 1, 1998	Partially revegetated enclosure is visible. Bare soil and standing liquid are present.
<b>Site 12 – Disposal Site near Water Tower</b>	
November 21, 1955	Site consisted of a small mound of dark-toned material.
April 3, 1963	Dark-toned material no longer present.
<b>AOC 1 – Scrap Metal Dump</b>	
October 1, 1942	Not specifically referenced, but area has apparently been cleared of trees and contains a large mound of light-toned material. Rail yard is under construction.
November 21, 1955	Not specifically referenced, but area of light-toned material appears to be partially revegetated.
April 3, 1963	Not referenced as an AOC, but area is noted to contain a large mound of fill.
October 23, 1975	Not specifically referenced, but area appears to be revegetated.



**TABLE 3-2**

**SUMMARY OF REPORTS CONTAINED IN THE ADMINISTRATIVE RECORD FILES  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>Date</b>	<b>Document</b>	<b>Prepared by</b>
February 1984	Initial Assessment Study of Naval Supply Center, Cheatham Annex and Yorktown Fuels Division	NEESA
June 1986	Confirmation Study, Step 1A (Verification Round One)	Dames & Moore
June 1988	Confirmation Study Step 1A (Round Two)	Dames & Moore
February 1991	Final RI Interim Report	Dames & Moore
April 1991	Final Report. New HRS Deficiency Information Collection Efforts. NSC Cheatham Annex Naval Facility	Baker
November 6, 1992	Final Community Relations Plan NSC Norfolk for Yorktown Fuels Division and Cheatham Annex	Baker
April 26, 1994	Architectural Survey and Assessment of the DuPont Factory Structures	Goodwin & Assoc
November 1994	Final Site Investigation for Sites 1, 10, and 11	Baker
September 1997	Site Screening Process Report, Sites 1, 10, and 11	Baker
May 1, 1998	Aerial Photographic Analysis	USEPA
October 1998	Final Project Plans, Field Investigation Report for Site 1 and Area of Concern (AOC) 1	Baker
Aug 14, 1998	Shoreline Assessment Letter Report	Baker
May 6, 1999	Recommendations for Erosion Mitigation Measures Letter Report (Site 1)	Baker
May 1999	Draft Final Field Investigation Report for Site 1 & AOC 2	Baker
August 8, 1999	Final Site Inspection Narrative Report Penniman Shell Loading Plant	Weston
August 24, 1999	Final Action Memorandum, Site 1, Landfill Near Incinerator	Baker
October 29, 1999	Final Data Acquisition/Summary Report Penniman Shell Loading Plant Site	USEPA
February 28, 2000	Final Site Management Plan for Fiscal Year 2000	Baker
June 23, 2000	Final Construction Close-Out Report, Site 1 Time Critical Removal Action	Baker

#### **4.0 SITE HISTORIES AND STATUS**

This section provides summaries of the site histories and status for each IR site and AOC. Additional Penniman related sites/areas have been added to the CAX IR Program, and other discovered areas may be added to the CAX IR program. The SMP will be revised to include future additional sites. For convenience and ease of cross-referencing, the section is organized by site/AOC, with all relevant information for a given site presented in the same subsection. For each site/AOC, site plans and history summaries are presented along with tabulations and location plans for previously collected samples (if applicable). Future activities planned for each site are also summarized. Detailed project schedules for IR activities at CAX are presented in Section 5.0.

## SITE 1 – LANDFILL NEAR INCINERATOR

Site 1 (Figure 4-1) is located along the York River behind the former location of the old incinerator. The incinerator has been dismantled. Although the exact date of dismantling is unknown, it is estimated to have occurred between 1989 and 1992. The incinerator building is indicated on figures included in the Remedial Investigation Interim Report (Dames and Moore, 1989), and the Site Investigation (conducted in 1992) states that the incinerator has been removed. From 1942 to 1951 the landfill was used as a disposal area for burn residues and from 1951 to 1972 as a general landfill. A variety of wastes, including empty paint cans and paint thinner cans, cartons of ether and other unspecified drugs, railroad ties, tar paper, sawdust, rags, concrete, and lumber, were burned and disposed in the landfill until 1981. After this time, the landfill was no longer used. An estimated 34,500 tons of solid waste were buried at the landfill (this is a very crude estimate). A percentage breakdown of the wastes is unknown (NEESA, 1984). The surface of the landfill is relatively flat and is overgrown with vegetation most portions of the year. Vegetation of the soil cover is spotty. The landfill was closed in 1981 by regrading, placing a 2-foot soil cover upon the debris and vegetating the soil cover. A fence encloses a portion of the landfill and vehicular access to this area by unauthorized personnel is restricted by a locked gate. There is no debris or other materials on the surface of the landfill within the fenced-in area. (There is a large debris pile present north of the fenced-in area, as discussed below). The fence was installed as part of a government training activity unrelated to the landfill, and does not correspond with the landfill perimeter. Access to the portions of the landfill outside of the fence is prevented by very rugged terrain and dense vegetation. Portions of the fence were taken down in 1998 to accommodate the geophysical survey conducted under the October 1998 Field Investigation.

The location of the landfill perimeter that is shown on Figure 4-1 is estimated and was determined based on interpretation of a landfill closure drawing (dated March 10, 1981) and review of aerial photographs presented in the Aerial Photographic Analysis (USEPA, 1998). The boundary was further delineated during the Field Investigation performed in 1998 (Baker, 1999c) via geophysical survey and shallow confirmatory soil borings and from the 1999 direct push investigation. The landfill occupies an area of approximately 1.3 acres, including the large metal debris pile.

There is a steep drop to the York River and adjacent creek at the edges of the open flat area. The areas immediately adjacent to the former landfill are wooded. The bank of the York River adjacent to the landfill is extremely steep (nearly vertical in areas), and is not vegetated. The York River is located approximately 25 feet below the landfill area at the bottom of the steep slope. Shoreline erosion studies (which are not currently available) have been conducted on the York River at CAX. Baker conducted a limited shoreline erosion assessment of the river bank in the vicinity of Site 1. In general terms, the assessment concluded that the erosion of the river bank is attributable to high water levels and wave action. The erosion is increased by factors such as wind, poor vegetation, and the presence of large trees along the top of the bank. As an interim measure, Baker recommended clearing trees within a distance of approximately two bank-heights (i.e., approximately 50 feet) from the toe of the slope, and establishing low-growing vegetation. The long-term solution entails cutting the slope back to 2 H to 1 V and installing a stone revetment at the toe of the slope. These recommendations are in general agreement with recommendations presented by Mr. Lee Hill, Virginia Department of Conservation and Recreation (VDCR), who reviews designs of shoreline erosion protection measures along the York River. Baker submitted the shoreline erosion assessment in the form of a letter report in August 1998 (Baker, 1998), as summarized in Section 3.1.7 of this SMP. In February and March 1999, a landscaping firm (contracted by LANTDIV) cleared the trees along the top of the slope (as recommended) along the landfill perimeter.

A large area of debris is present to the north of the landfill. The area contains cables, conex boxes, an empty storage tank, automobiles, airplane/boat parts, and other miscellaneous items. This area was previously designated as AOC 5 – Debris Area, but is currently being managed as part of Site 1. The area is depicted on Figure 4-1. Landfill contents (including metal scrap, wood, drums, containers and other miscellaneous debris) are exposed along portions of the western perimeter of the landfill along the edge of the marsh associated with the unnamed tributary to the York River.

A small area along the northeastern perimeter was undergoing erosion and it appeared that landfill contents may be slowly washing into the York River. In this area, a thin layer of debris was exposed. A small rusty bucket which contained an unidentified yellow substance was present within the bank. This container was removed from the site and characterized during August 1999 as part of the TCRA sampling. The material was suspected to be incinerated paint and contained a high level of leachable lead. Small clumps of ash/incinerator residue (and other debris which apparently originated from the landfill) is sparsely present on the beach. The potential washing of debris into the York River and the exposed debris along the northeastern perimeter was initially noticed by Baker on March 15, 1999, during a routine visit to the site to observe the progress of the tree clearing. The area in which the landfill perimeter was eroding was difficult to access during high tide and was littered with fallen/washed up trees/wood. It is not known how long the erosion of the northeastern perimeter along the York River may have been occurring. A TCRA was conducted to remove the debris that had collected on the beach area (December 1999) and to stabilize the toe of the bank in the erosion area (January 2000). Toe stabilization was accomplished by installation of three sand-filled geosynthetic tubes. The measures implemented were initially described in a letter report issued by Baker May 6, 1999. The TCRA was implemented to stabilize the site until the long-term solution for the management of the Site 1 landfill is implemented. The Final Action Memorandum for the TCRA was prepared by Baker in August 1999 (Baker, 1999d).

There are eight monitoring wells present at the site. Monitoring wells 1GW01 through 1GW04 were installed as part of the landfill closure which occurred in 1981. These wells are constructed of 5 foot long stainless steel well points (1 1/4 inches diameter), with 4 inch diameter galvanized steel riser. Monitoring wells 1GW05 and 1GW06 were installed in 1985 under the Confirmation Study (Dames and Moore, 1986). These monitoring wells are constructed of 2 inch diameter polyvinyl chloride (PVC). Monitoring wells 1GW07 and 1GW08 were installed by Weston as part of the Site Investigation in 1992 (Weston, 1994). These wells are constructed of 4 inch diameter PVC. The locations of the wells are shown on Figure 4-1.

In July 1983, LANTDIV collected a round of groundwater samples from each of the four existing monitoring wells. The sampling, which was apparently not part of any formal investigation included analysis for purgeable organics, engineering parameters, and select metals. Results were compared to groundwater quality standards and criteria. Total organic carbon, phenolics, iron, lead and zinc were elevated and pH was outside of the acceptable range. Iron, lead and zinc levels were not unexpected due to the galvanized steel well casing. Two additional rounds of groundwater sampling were recommended.

Because of wastes disposed at the site (including paints, paint thinners, ether and unspecified drugs), the IAS recommended additional study for Site 1 to investigate potential contamination of groundwater and the York River.

The Confirmation Study Step 1A (Verification), Round One (Dames and Moore, 1986) included installation of two new monitoring wells (1GW05 and 1GW06) and collection of groundwater samples from the four existing wells and two newly installed wells.

The Confirmation Study Step 1A (Verification), Round Two (Dames and Moore, 1988) included collection of an additional round of groundwater samples from the six monitoring wells in 1987.

The Final Remedial Investigation Interim Report (Dames and Moore, 1991) summarized the findings of the Confirmation Study. Potentially site-related contaminants detected in the Confirmation Study groundwater samples included oil and grease, and total phenols. The report recommended the site for further investigation to better define the nature and extent of contamination at the site. Recommended efforts included aerial photographic analysis, collection of an additional round of groundwater samples, and performance of a risk assessment.

The Site Investigation for Site 1 (Weston, 1994) included installation of two new monitoring wells (1GW07 and 1GW08), with collection of soil samples from both monitoring well borings. Groundwater samples were collected from each of the existing and newly installed monitoring wells, with the exception of well 1GW01, which was dry. A total of six sediment samples were collected from three sampling stations (two samples per station).

Samples of ash/soil exhibited elevated levels of metals, PCBs, and total petroleum hydrocarbons (TPH), and detectable levels of SVOCs. The VOCs 4-methyl-2-pentanone and trichloroethylene (TCE), and TPH and metals were detected in groundwater, and the sediment samples contained low levels of TCE, SVOCs, TPH and metals.

The Site Investigation concluded that a major release of contaminants to groundwater has not occurred and that as most of the debris is adequately covered, no immediate response or further investigation is required. The report did recommend re-sampling of monitoring wells for VOCs and dissolved (filtered) metals and a file search of past records to verify closure status of the landfill.

In August 1997, Baker collected groundwater samples from seven of the eight monitoring wells at Site 1. Well 1GW03 could not be located at the time of the investigation. The samples were analyzed for TCL organics and TAL metals - total and dissolved. These samples were collected as part of the SSP investigation (Baker, 1997). No organic compounds were detected. Concentrations of total (unfiltered) metals were significantly lower in the 1997 samples than in previously collected samples due to the employment of low-flow sampling during the SSP investigation. Certain metals were detected at elevated levels.

The SSP also included human health and ecological risk screening to determine whether contaminants detected in environmental media pose unacceptable risks to human receptors and/or the environment. The risk screening process was completed in accordance with the SSP Guidelines (Baker, 1994), and included previously collected soil and sediment samples.

The following is a summary of the conclusions/results that were resented in the SSP Report for Site 1:

- Based on the available analytical data, no unacceptable human health or ecological risks are posed by the site.
- Based on the available analytical data, no additional investigation or remedial action is warranted.

- The soil cover of the landfill should be maintained - trees that are growing through the cover should be removed.
- Monitoring wells that penetrate the landfill should be abandoned to eliminate a future potential pathway of contaminants from the fill material.

The Field Investigation was conducted by Baker in 1998. This study included a geophysical survey to define the lateral extent of the landfill, and limited soil, sediment, and surface water sampling. Elevated levels of contaminants (primarily PAHs and heavy metals) were detected in soil and sediment. For Site 1, the Field Investigation Report (Baker, 1999c) recommended the following:

- Remove surficial debris that has collected on the flat, inter-tidal beach area in the vicinity of the eroding bank.
- Develop and implement interim measures that can be quickly installed to mitigate erosion in the 60-foot stretch of shoreline where the landfill is being undermined. (Baker developed recommendations for the interim erosion control measures for the small area of exposed debris at Site 1 in the letter report submitted May 6, 1999). The recommendations included use of sand-filled geotextile tubes as a shoreline revetment. Construction should be implemented as a TCRA.
- Institute a periodic inspection program so that the condition of the slope can be monitored and documented.
- Consider abandoning monitoring wells 1GW01, 1GW02, 1GW03, 1GW04, and 1GW07 due to the installation of these monitoring wells through the landfill and/or monitoring well integrity.
- Develop and implement solutions for long-term management of the landfill.

In November 1999 five additional exploratory hand auger borings and ten additional direct push borings were advanced to assess the soil cover and further delineate the extent of the landfill. In April 2000, six additional punch borings were advanced and two additional monitoring wells (1-GW09 and 1-GW10) were installed, developed, and sampled. These samples were collected in support of the RI Report (Baker, 2000d).

In June 2000 the Final Construction Closeout Report – Site 1 Time Critical Removal Action was submitted. This report summarizes the construction activities associated with the TCRA performed at Site 1 – Landfill near Incinerator (Baker, 2000b). The TCRA for Site 1 was conducted to remove the debris that had collected on the beach area and to temporarily stabilize the toe of the bank in the erosion area. Toe stabilization was accomplished by installation of three sand-filled geotextile tubes. The TCRA was implemented to stabilize the site until the long-term solution for the management of the Site 1 landfill is implemented. A Final Action Memorandum for the TCRA was prepared by Baker in August 1999.

In August 2000 the Draft Final Remedial Investigation Report – Site 1 Landfill Near Incinerator was submitted. This report presents the results of the RI that was conducted at Site 1. Data evaluation for this RI Report included soil samples from 1999 and soil and groundwater samples from 2000, as well as soil samples from 1992, and soil, surface water and sediment samples from 1998. Results of the investigation show that the landfill contains a variety of wastes that are both non-hazardous and hazardous by characteristic. The analytical data presented show that samples of landfilled material exhibit the presence of PAHs, pesticides, PCBs, and inorganic compounds, particularly copper and lead. The data shows evidence suggesting the landfill has impacted the surrounding environment to a limited extent. The RI Report made the following recommendations:

- A feasibility study should be conducted at Site 1.
- Remediation at Site 1 should focus on the elimination of exposure of future receptors to landfilled materials, removal of surface debris, and to prevent erosion of landfilled materials along the banks of the York River and unnamed tributary.
- The debris pile should be surveyed and inventoried. Some materials may be sold as scrap, which could offset some of the cost for removal.
- An ecological risk assessment for Site 1 will be conducted as a stand alone document.

Subsequently, in November 2000, the Draft Final Focused Feasibility for Site 1 was submitted. This report presents the Focused Feasibility Study completed for Site 1 – Landfill Near Incinerator. The purpose of the Focused FS for Site 1 is to identify remedial actions alternatives (RAAs) that are protective of human health and the environment, and that cost-effectively attain appropriate Federal and state (Commonwealth) requirements. A focused FS, which would focus on a limited number of remedies for the surface soil remediation at the site, was agreed upon by the WPNSTA Yorktown Partnering Team. The area of concern at Site 1 from a human health risk perspective is the soil inside the landfill. From this perspective, the following three RAAs were developed for Site 1.

- RAA 1: No action.
- RAA 2: Shoreline erosion control, surface debris removal, and soil cover.
- RAA 3: Surface debris removal and excavation with off-site disposal.

Samples collected under previous investigations at Site 1 are tabulated on Table 4-1 and locations are depicted on Figure 4-1A. A summary of significant environmental actions/activities to date for Site 1 is presented on Table 4-1A.

#### **Status of Site 1 – Landfill near Incinerator**

Based on the analytical data collected under the Field Investigation and previous investigations, soil and sediment in the vicinity of the landfill have been adversely impacted by contaminant migration and/or leaching. The most significant contamination consists of SVOCs, PAHs and metals (including lead and other heavy metals). PCBs were also detected at potentially actionable levels (i.e. greater than

1.0 parts per million [ppm]) in soil and sediment. LANTDIV is actively addressing the contamination being released by the site.

**Future Activities Planned for Site 1 – Landfill near Incinerator**

Future planned activities for Site 1 include:

- Finalize RI report for long-term management of the landfill (April 2001, pending agency comments)
- Finalize Focused FS to evaluate options for improvements to be made to the landfill (January 2001, pending agency comments)
- Preliminary design for long-term improvements for the landfill -- debris pile and cover (March 2001)
- Spring 2001 Field Investigation - collection of surface soil, surface water, and sediment data to fill data gaps to complete screening-level ERA (June 2001)
- Finalize Screening-Level ERA Report (July 2001)
- Finalize PRAP and ROD for long-term improvements for the landfill (July 2001)
- Finalize design for shore line protection (December 2001)
- Construction of remedial measures (FY 2002, not scheduled or funded)
- Site closeout – long-term monitoring (if necessary) and documentation (2002 and beyond, not funded)



TABLE 4-1

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**SITE 1 - LANDFILL NEAR INCINERATOR**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

Sample ID	Current Monitoring Well ID	Media	Analytical Parameters
<b>JULY 1983 GROUNDWATER SAMPLING</b>			
Well 1 through Well 4	1GW01 through 1GW04	Groundwater	Purgeable organics, various engineering parameters, and metals
<b>1986 CONFIRMATION STUDY</b>			
1EW01	1GW01	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1EW02	1GW02	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1EW03	1GW03	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1EW04	1GW04	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1GW05	1GW05	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1GW06	1GW06	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
<b>1987 CONFIRMATION STUDY</b>			
1EW01	1GW01	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1EW02	1GW02	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1EW03	1GW03	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1EW04	1GW04	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1GW05	1GW05	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
1GW06	1GW06	Groundwater	VOCs, SVOCs, pesticides/PCBs, inorganics, oil & grease
<b>1992 SITE INVESTIGATION</b>			
1SB07-1A	1GW07	Surface Soil (included incinerated fill material) 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
1SB07-2A	1GW07	Subsurface Soil 8-10 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
1SB07-3A	1GW07	Subsurface Soil 14-16 ft bgs	VOCs, SVOCs, TOC, TPH, inorganics, PCBs, and dioxins
1SB08-1A	1GW08	Surface Soil 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics

TABLE 4-1 (Continued)

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**SITE 1 - LANDFILL NEAR INCINERATOR**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

Sample ID	Current Monitoring Well ID	Media	Analytical Parameters
<b>1992 SITE INVESTIGATION (continued)</b>			
1SB08-2A	1GW08	Subsurface Soil 10-12 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
1SB08-3A	1GW08	Subsurface Soil 16-18 ft bgs	VOCs, SVOCs, TOC, TPH, inorganics, PCB, and dioxins
1EW02-1A	1GW02	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1EW03-1A	1GW03	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1EW04-1A	1GW04	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1GW05-1A	1GW05	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1GW06-1A	1GW06	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1GW07-1A	1GW07	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1GW08-1A	1GW08	Groundwater	VOCs, SVOCs, TPH, TOC, total & dissolved inorganics
1MS01-1A	NA	Marsh Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
1MS01-2A	NA	Marsh Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics
1MS02-1A	NA	Marsh Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
1MS02-2A	NA	Marsh Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics
1MS03-1A	NA	Marsh Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
1MS03-2A	NA	Marsh Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics
<b>1997 SITE SCREENING PROCESS INVESTIGATION</b>			
1GW01	1GW01	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1GW02	1GW02	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1GW04	1GW04	Groundwater	VOCs, SVOCs, pesticides/PCBs, dissolved inorganics

TABLE 4-1 (Continued)

SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
 SITE 1 - LANDFILL NEAR INCINERATOR  
 INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
 NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
 CHEATHAM ANNEX SITE

Sample ID	Current Monitoring Well ID	Media	Analytical Parameters
<b>1997 SITE SCREENING PROCESS INVESTIGATION (continued)</b>			
1GW05	1GW05	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1GW06	1GW06	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1GW07	1GW07	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1GW08	1GW08	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
<b>1998 FIELD INVESTIGATION REPORT</b>			
1-HA01-00	NA	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
1-HA02-00	NA	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
1-HA01-02	NA	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
1-HA02-02	NA	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
1-SW01	NA	Surface Water	TCL organics, nitramines, TAL inorganics and cyanide
1-SW02	NA	Surface Water	TCL organics, nitramines, TAL inorganics and cyanide
1-SW03	NA	Surface Water	TCL organics, nitramines, TAL inorganics and cyanide
1-SD01	NA	Sediment	TCL organics, nitramines, TAL inorganics and cyanide
1-SD02	NA	Sediment	TCL organics, nitramines, TAL inorganics and cyanide
1-SD03	NA	Sediment	TCL organics, nitramines, TAL inorganics and cyanide
1-SD04	NA	Sediment	TCL organics, nitramines, TAL inorganics and cyanide
<b>1999 TCRA SAMPLING</b>			
01-TCRA01	NA	Exposed landfill contents along eroding bank	TCLP metals, hazardous waste profile
01-TCRA02	NA	Native soil underlying exposed landfill contents	TCLP metals, hazardous waste profile
01-TCRA03	NA	Yellow substance in rusty container	TCLP lead
<b>1999 PRE-DESIGN INVESTIGATION</b>			
1-DPB02-02	NA	Incinerator Ash	TCL organics, nitramines, TAL inorganics and cyanide
1-DPB05-01	NA	Landfill Cover Soil	TCL organics, nitramines, TAL inorganics and cyanide
1-DPB06-01	NA	Landfill Cover Soil	TCL organics, nitramines, TAL inorganics and cyanide
1-DPB06-02	NA	Incinerator Ash	TCL organics, nitramines, TAL inorganics and cyanide
1-DPB07-03	NA	Native Soil Underlying Landfill	TCL organics, nitramines, TAL inorganics and cyanide
1-DPB09-03	NA	Native Soil Underlying Landfill	TCL organics, nitramines, TAL inorganics and cyanide
1-DPB10-02	NA	Incinerator Ash	TCL organics, nitramines, TAL inorganics and cyanide

TABLE 4-1 (Continued)

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**SITE 1 - LANDFILL NEAR INCINERATOR**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

Sample ID	Current Monitoring Well ID	Media	Analytical Parameters
<b>1999 PRE-DESIGN INVESTIGATION (continued)</b>			
1-DPBCOMP-01	NA	Composite of Ash from Borings	TCLP parameters, RCRA characteristics
1-DPB04-COMP	NA	Composite of Ash from 1-DPB04	TCLP parameters, RCRA characteristics
<b>APRIL 2000 MONITORING WELL INSTALLATION AND SAMPLING</b>			
1-GW05-00	1-GW05	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1-GW06-00	1-GW06	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1-GW07-00	1-GW07	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1-GW09-00	1-GW09	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
1-GW10-00	1-GW10	Groundwater	VOCs, SVOCs, pesticides/PCBs, total & dissolved inorganics
00-PB01	NA	Soil	
00-PB02	NA	Soil	
00-PB03	NA	Soil	
00-PB04	NA	Soil	
00-PB05	NA	Soil	
00-PB06	NA	Soil	

## Notes:

bgs = Below Ground Surface  
 NA = Not Applicable  
 PCB = Polychlorinated Biphenyl  
 SVOC = Semivolatile Organic Compounds  
 RCRA = Resource Conservation and Recovery Act

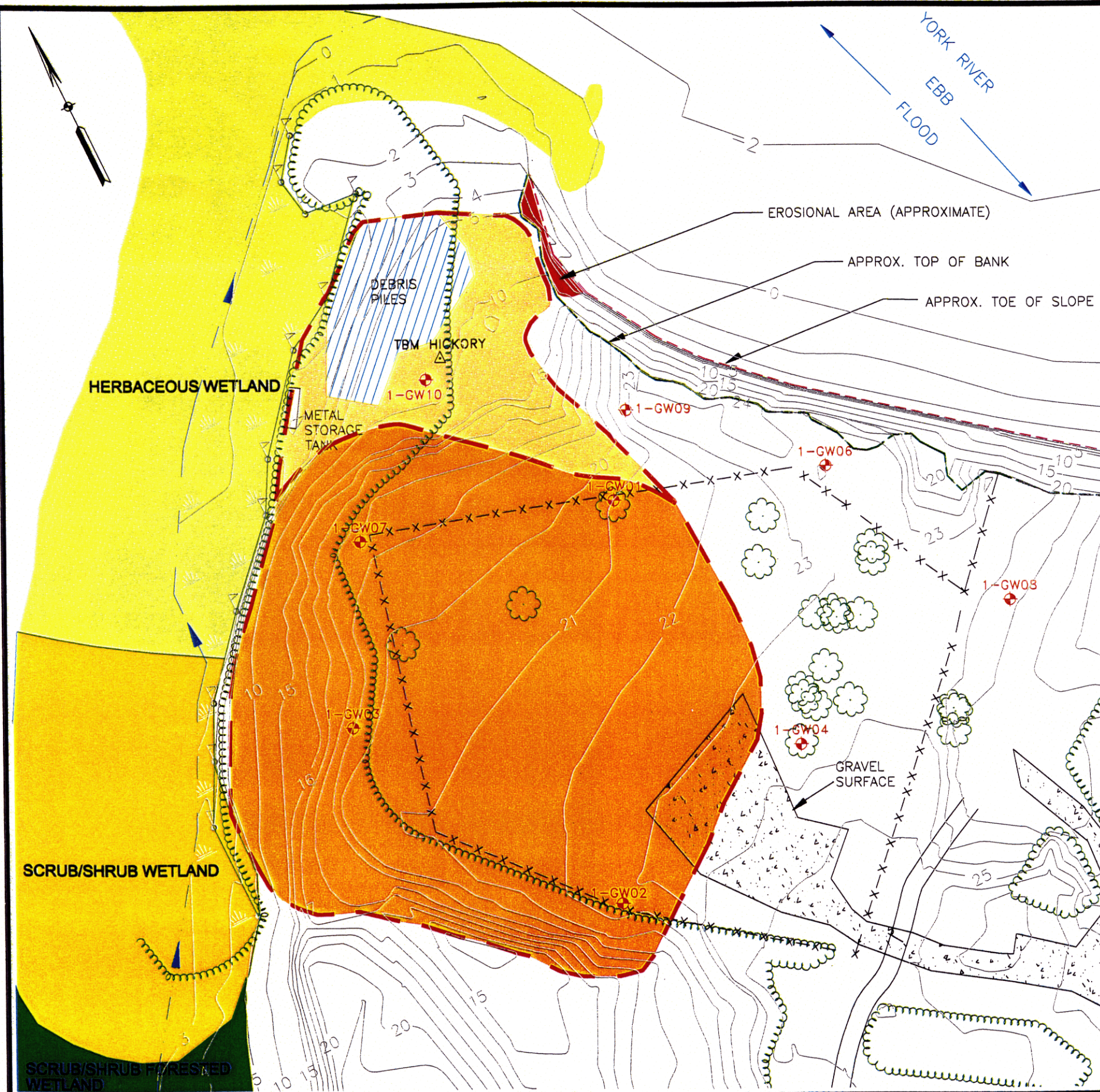
TCLP = Toxicity Characteristics Leaching Procedure  
 TOC = Total Organic Carbon  
 TPH = Total Petroleum Hydrocarbons  
 VOC = Volatile Organic Compound  
 Quality Assurance/Quality Control (QA/QC) Samples are not listed.

TABLE 4-1A

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 1 – LANDFILL NEAR INCINERATOR  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 1 – LANDFILL NEAR INCINERATOR</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1942 to 1951	Initial phase of landfill operation	Primarily receiving incinerator burning residues
1951 to 1972	Operating as a general landfill	Receiving general wastes in addition to incinerator residue
1972 to 1981	Final phase of operation	Occasionally receiving masonry and wood
1981	Landfill inactive	No longer receiving waste. Soil cover placed over most of landfill. Four monitoring wells installed (1GW01 through 1GW04)
July 8, 1983	Initial round of groundwater sampling	LANTNAVFACENGCOM collects from the four existing monitoring wells
1984	IAS (NEESA)	Recommends additional Study in form of Confirmation Study due to nature of wastes in landfill
1986	Confirmation Study, Step 1A (Verification) Round One (Dames and Moore)	Two new monitoring wells installed (1GW05 and 1GW06). Groundwater samples collected from new and existing monitoring wells
1988	Confirmation Study, Step 1A (Verification) Round Two (Dames and Moore)	Additional round of groundwater samples collected from all six monitoring wells
1991	Final RI Interim Report (Dames and Moore)	Summarizes Confirmation Study. Recommends additional RI efforts
1994	Final Site Investigation Report (Weston)	Two new monitoring wells installed (1-GW07 and 1-GW08). Soil, groundwater, and sediment sampled
1997	Final Site Screening Process Report (Baker)	Additional round of groundwater samples collected from all six monitoring wells
1998	Field Investigation (Baker)	PAH and lead contamination detected in soil and sediment
March 1999	Baker notices erosion of landfill perimeter	Landfill contents washing onto beach and into York River
May 6, 1999	Baker issues letter report recommending geotextile tube revetment to mitigate erosion at Site 1	Construction to be performed under a TCRA
August 1999	Baker submits Final Action Memorandum	Documents proposed activities under TCRA
November 1999	Pre-Design Investigation	Five hand auger borings. Ten direct push borings.
January 2000	TCRA Construction	Removed debris from beach, installed geotube revetment.
June 2000	Final Construction Closeout Report – Site 1 TCRA	Summarizes construction activities performed under TCRA
August 2000	Draft Final Remedial Investigation Report – Site 1	Summarizes results of Remedial Investigation
November 2000	Draft Focused Feasibility Study – Site 1	Summarizes RAAs for Site 1.
Future Activities	Implement remedial action process to evaluate landfill improvements.	Finalize RI April 2001. Finalize Focused FS (January 2001). Spring 2001 field investigation to obtain additional data for completion of ERA.





## LEGEND

SOIL MATRIX WITH VARYING PROPORTIONS OF DEBRIS	
LANDFILL	
EXISTING MONITORING WELL	
STORM DRAIN MANHOLE	
STORM DRAIN INLET (DI)	
EXISTING GROUND SURFACE ELEVATION CONTOURS	
WETLAND FLAG	
WETLANDS	
8-FOOT CHAIN LINK FENCE	
TREE LINE	
TREES/SHRUBS	
ELECTRIC POLES/LINES	
RAILROAD TRACKS	
GPS CONTROL STATION	
STREAM WITH (EBB) FLOW DIRECTION	

## NOTES:

- 1) BASE MAP SOURCE: PHR&A, 12/99.
- 2) ALL ELEVATIONS ARE FEET, NAVD 88.
- 3) WETLAND LOCATIONS ARE APPROXIMATE.

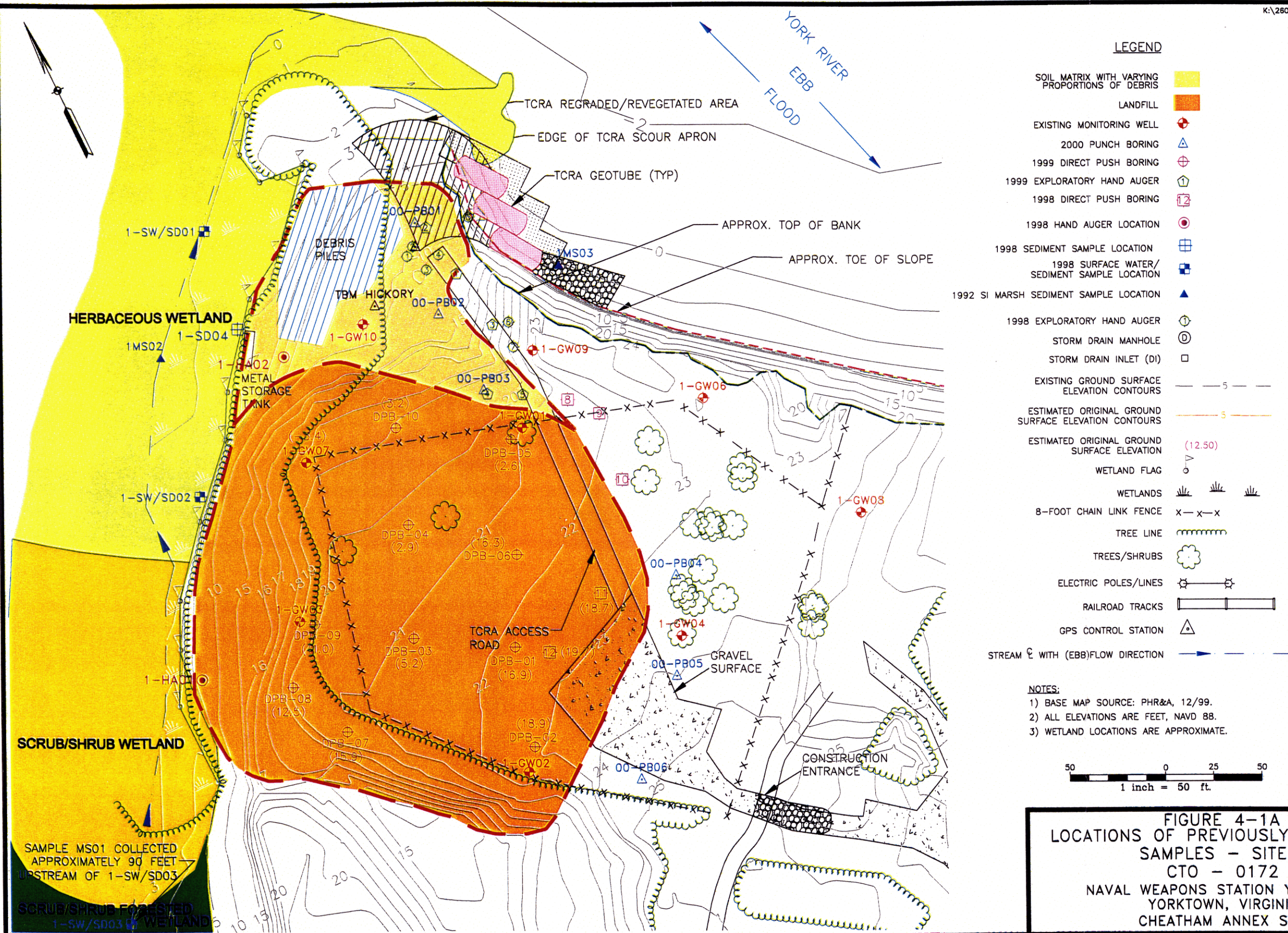
50 0 25 50  
1 inch = 50 ft.

**Baker**  
Baker Environmental, Inc.

FIGURE 4-1  
SITE PLAN  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE







## **SITE 2 – CONTAMINATED FOOD DISPOSAL AREA**

This site is located in a grassy area in the woods behind the cold storage warehouse (Building CAD 40) as shown on Figure 4-2. The disposal pit measured approximately 50 feet in diameter and was 12 to 15 feet deep. Ammonia-contaminated frozen food was buried there in 1970. The ammonia was the result of a leak that developed in one of the cold storage rooms. The food was buried with cellophane wrappers and boxes intact. Approximately 100 cubic yards of food, worth an estimated \$300,000, was tainted. The burial area was selected by the CAX Ranger and received only contaminated food. The site was overgrown at the time of the IAS (NEESA, 1984). The IAS concluded that additional study was not warranted for the site due to the decomposable nature of the wastes buried at the site.

A summary of significant environmental actions/activities to date for Site 2 is presented on Table 4-2.

### **Status of Site 2 – Contaminated Food Disposal Area**

Based on the inert nature of the materials that were reportedly buried at Site 2, the site is not considered to be a significant source of contamination.

### **Future Activities Planned for Site 2 – Contaminated Food Disposal Area**

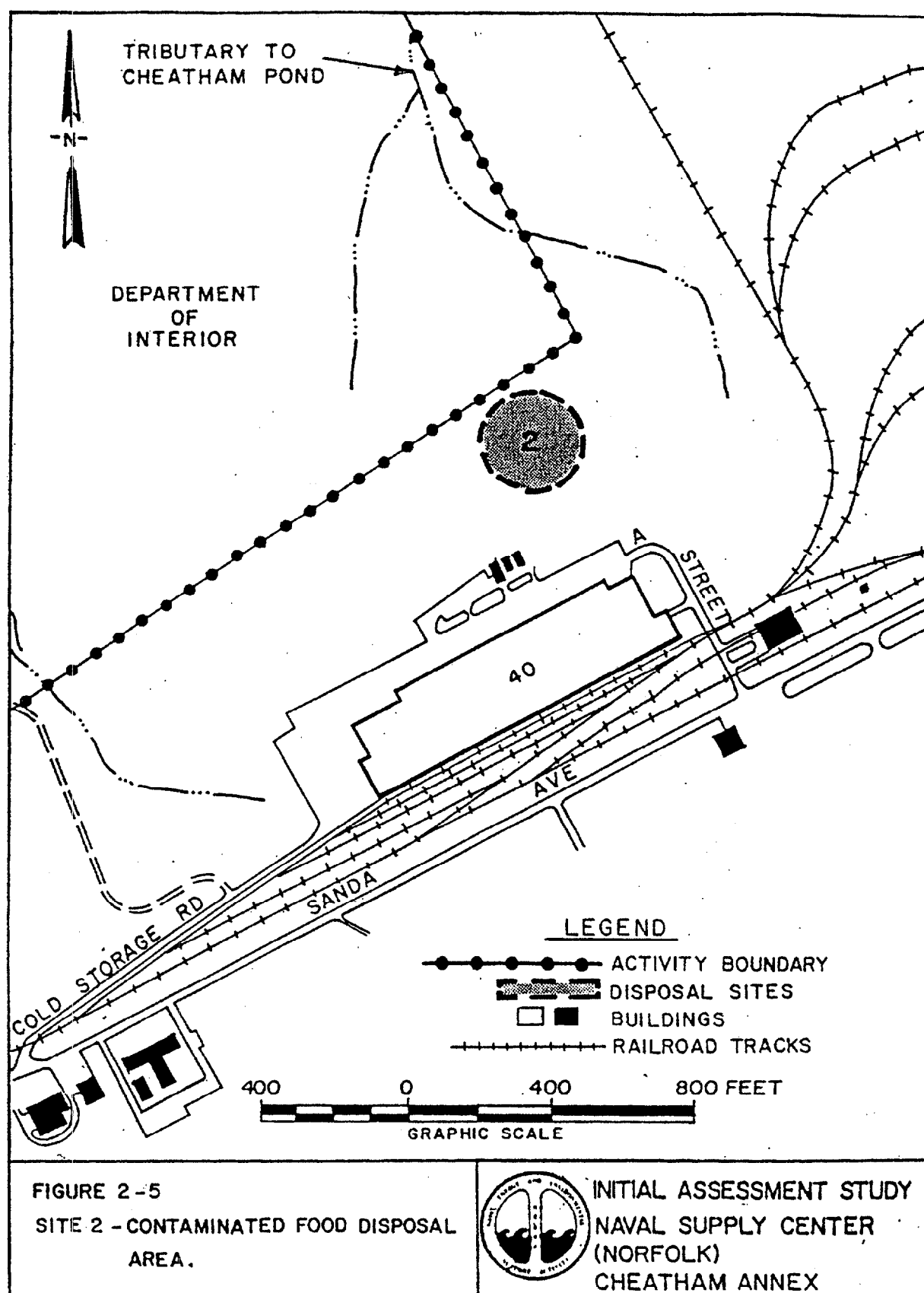
The VDEQ is seeking additional documentation/certification that only food was disposed at the site. If available, LANTDIV will provide such information. Future activities at this site are not planned unless new information regarding sources of contamination is discovered.



**TABLE 4-2**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 2 – CONTAMINATED FOOD DISPOSAL AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 2 – CONTAMINATED FOOD DISPOSAL AREA</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1970	Ammonia-contaminated food buried at site.	One-time buried disposal.
1984	IAS (NEESA)	Recommends no further study due to inert nature of materials buried at the site.
Future Activities	No future activities planned.	If available, LANTDIV will provide documentation stating that only food was disposed at the site.



NOTE:

1. This figure was reproduced from Figure 2-5 from the IAS Report (NEESA, 1984)

**Baker**  
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FIGURE 4-2  
SITE PLAN - SITE 2  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

01216 I 03Z

### **SITE 3 – SUBMARINE DYE DISPOSAL AREA**

This site is located at the northeastern corner of Building CAD 15 as shown on Figure 4-3. The area is presently used as a storage lot. The dye was stored in 55-gallon drums on two or three pallets located between the warehouses. The drums corroded and dye leaked onto the ground and into the storm sewer system. During rain events, puddles containing a green fluorescein dye were observed. At times, the dye would leak into the storm sewer leading to the York River, turning the river green. The Coast Guard notified the Activity and the drums were subsequently removed. The drums of fluorescein were reportedly stored and removed in the early 1970s (NEESA, 1984).

Fluorescein is prepared by heating phthalic anhydride with resorcinol, and is used primarily for studying subterranean waters. This type of dye is used for ascertaining sources of springs, connections between streams and sea, and detecting sources of groundwater contamination. It is approved by the Food and Drug Administration for use in externally-applied drugs and cosmetics. Fluorescein is soluble in alkali hydroxides or carbonates, with a bright green fluorescent green, appearing red by transmitted light (Merck, 1989).

The IAS concluded that additional study was not warranted for the site because the dye no longer posed an environmental hazard.

A summary of significant environmental actions/activities to date for Site 3 is presented on Table 4-3.

#### **Status of Site 3 – Submarine Dye Disposal Area**

Based on the inert nature of the dye that was reportedly spilled at Site 3, the site is not considered to be a significant source of contamination.

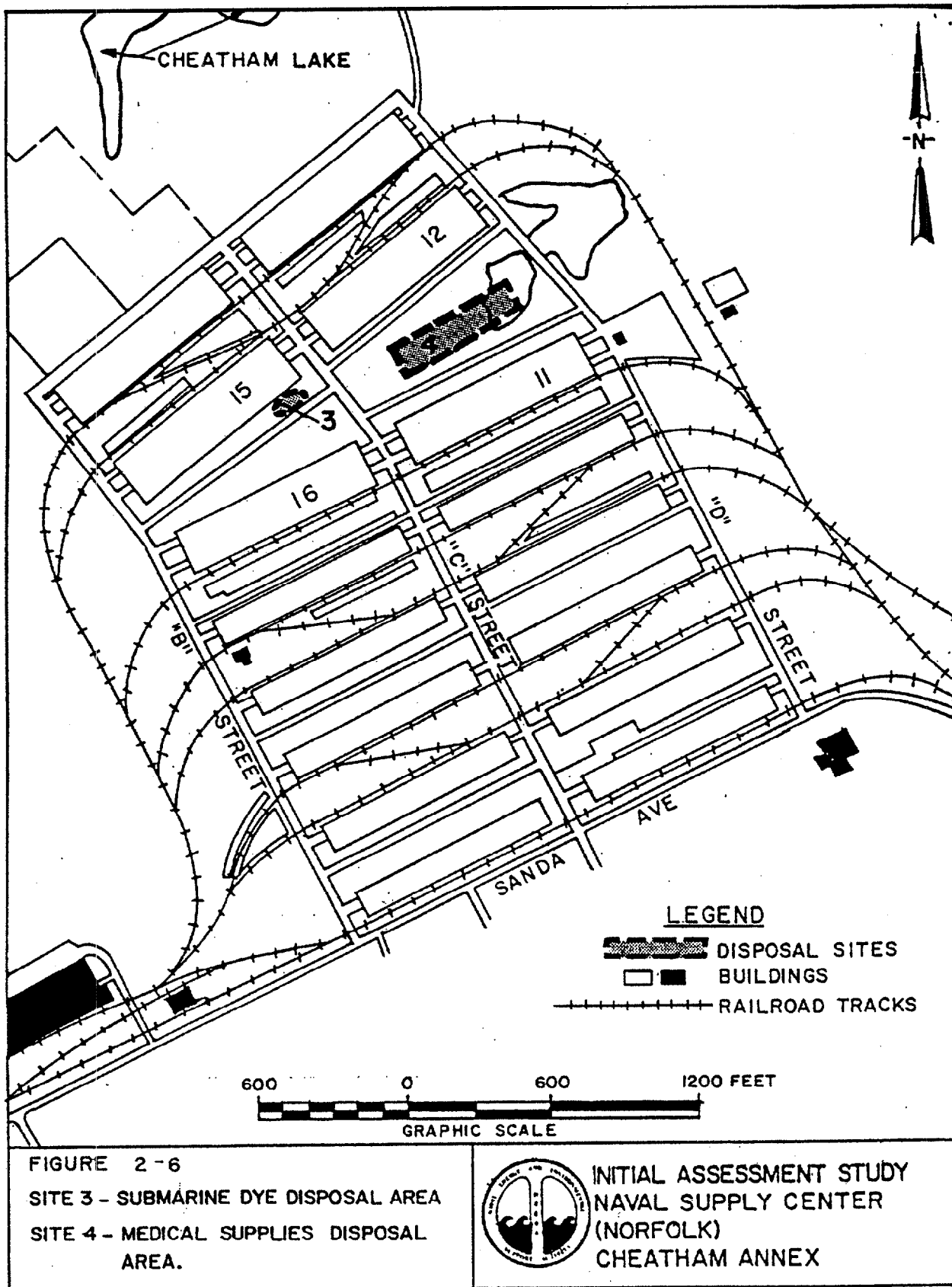
#### **Future Activities Planned for Site 3 – Submarine Dye Disposal Area**

The VDEQ has requested that the Navy provide chemical-specific information on the dye that spilled at the site. The Navy should also document that no solvents were used in association with the dye. If available, LANTDIV will provide such information. Future activities at this site are not planned unless new information regarding sources of contamination is discovered.

**TABLE 4-3**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 3 – SUBMARINE DYE DISPOSAL AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 3 – SUBMARINE DYE DISPOSAL AREA</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
Early 1970s	Fluorescein dye stored near Building Cad 15. Unknown quantity spilled into storm sewer system and was subsequently conveyed to York River.	Dye reportedly inert.
1984	IAS (NEESA)	Recommends no further study due to inert nature of the dye and because no environmental hazard was posed by the site.
Future Activities	No future activities planned.	If available, LANTDIV will provide documentation listing the components of the dye and also verify that no solvents were used in association with the dye.



NOTE:

1. This figure was reproduced from Figure 2-6 from the IAS Report (NEESA, 1984)

**Baker**  
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FIGURE 4-3  
SITE PLAN - SITE 3  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



#### **SITE 4 -- MEDICAL SUPPLIES DISPOSAL AREA**

Site 4 is located along the pond just upgradient of Youth Pond, between buildings CAD 11 and CAD 12. In 1968 or 1969, out-of-date medical supplies possibly including syringes and empty intravenous (IV) bottles, and one-inch metal banding were unloaded down a bank in this area and covered with soil. It was reported that as much as 7,000 cubic yards of material was disposed at this site. (NEESA, 1984). Previously (date unknown), a considerable volume of these materials were reportedly removed from the site because syringe needles were getting stuck in deer hooves. After heavy rains, what appeared to be syringes could sometimes be seen floating in the adjacent pond and in Youth Pond (both upstream and downstream of D Street) (NEESA, 1984). Observations in IAS field notes show that it is possible dyes were disposed of at the site. The location, volume or types of dyes are not known.

The IAS concluded that additional study was not warranted for the site due to the inert nature of the materials disposed.

During a May 4, 1998, site visit with VDEQ representatives, packages of what appeared to be unused needles wrapped in foil were noted within the drainage swale leading to the unnamed pond.

In May 1998, Reactives Management, Inc. performed routine housekeeping activities at Site 4 to remove surficial debris. No I.V. bottles or bags were encountered. What was previously reported as I.V. bags or bottles was determined to be I.V. injection sets. Many of the sets were contained in aluminum or plastic bags. Plastic and metal sharps were also encountered along with small quantities (15 containers) of injectable drugs. The injectable drug containers contained either residue or small volumes (a few milliliters of liquid) and had either no labels or labels that were not legible. Approximately 200 pounds of debris and 13 pounds of sharps (metal and plastic) were recovered from the site and incinerated. Debris was removed from the surface, by hand or with hand tools, and no intrusive work (e.g., excavation) was conducted. Debris other than medical supplies including metal banding, railroad ties, metal, corroded drums, beverage containers was present at the site, but not removed (Reactivities Management, 1998). A site plan for Site 4 is presented as Figure 4-4.

In November 1999, a Field Investigation that included sampling of surface soil, subsurface soil, and sediment within and immediately down-gradient of the disposal area and the scrap metal banding pile was conducted. Samples collected during the 1999 Field Investigation at Site 4 are tabulated on Table 4-4 and locations are depicted on Figure 4-4A. VOCs, SVOCs, pesticides, PCBs, inorganics, and cyanide were detected in the soil samples. VOCs, SVOCs, pesticides, PCBs, and inorganics were detected in the sediment samples. The presence of the organic contaminants could be attributable to the extensive debris that is buried at the site. The detected concentrations of inorganics could result from the pieces of scrap metal present at the site.

The Draft Final Site Inspection Report (Baker, 2000e) recommended that a limited investigation to define the lateral extent of debris at the site be performed. In addition, an EE/CA was recommended to evaluate the most appropriate means of removing or covering the debris that is present at the site.

A summary of significant environmental actions/activities to date for Site 4 is presented on Table 4-4.

#### **Status of Site 4 -- Medical Supplies Disposal Area**

LANTDIV recognizes that sources of contamination may be present at the site. It will be necessary to remove the medical supply debris and to address the lateral extent of debris at the site.

#### **Future Activities Planned for Site 4 – Medical Supplies Disposal Area**

Future planned activities for Site 4 include:

- Finalize SI Report (March 2001)
- Finalize EE/CA to address potential hazards posed by the site (early FY2002, pending schedule determined by WPNSTA Partnering Team)
- Preliminary design package for debris stabilization (April 2001)
- Spring 2001 Field Investigation - a detailed topographic and horizontal feature survey of Site 4 is proposed to be conducted to create a base map for design (June 2001)
- Finalize Action Memorandum for Site 4 removal activities -- if necessary (FY2002, not funded)
- Finalize Screening-Level ERA Report (October 2001)
- Removal Action to address debris at Site 4 -- if necessary (FY 2003, not funded)
- Site closeout documentation – if necessary (FY 2003, not funded)
- If warranted, the Remedial Action process will be initiated.

TABLE 4-4

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**SITE 4 – MEDICAL SUPPLIES DISPOSAL AREA**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

Sample ID	Media	Analytical Parameters
<b>NOVEMBER 1999 FIELD INVESTIGATION</b>		
4-HA01-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA02-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA03-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA04-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA05-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA06-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA01-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA02-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA03-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA04-01	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA05-01	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-HA06-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
4-SD01-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD02-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD03-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD04-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD01-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD02-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD03-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
4-SD04-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide

Notes:

TCL = Target Compound List

TAL = Target Analyte List

Quality Assurance/Quality Control (QA/QC) Samples are not listed.

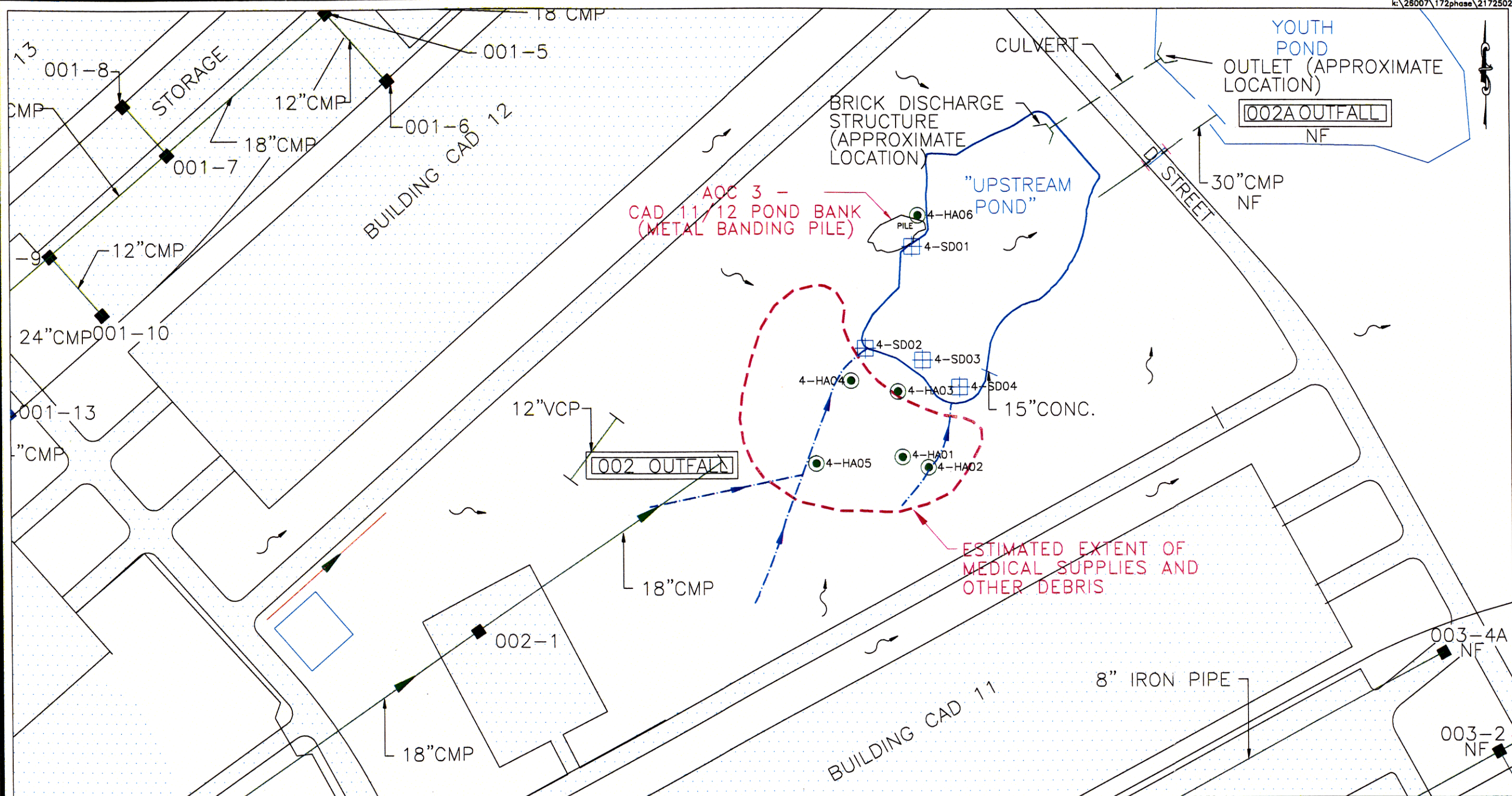
**TABLE 4-4A**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 4 – MEDICAL SUPPLIES DISPOSAL AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 4 – MEDICAL SUPPLIES DISPOSAL AREA</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1968 or 1969	Syringes, empty IV bottles, metal banding and other miscellaneous debris unloaded and covered with soil.	Exact date and quantity of materials unknown. As much as 7,000 cubic yards of material may have been disposed.
Date unknown (pre-IAS)	A considerable volume of the materials removed from the site.	Removal undertaken because syringes were getting stuck in deer's hooves.
1984	IAS (NEESA)	Recommends no further study due to inert nature of materials disposed at the site.
May 4, 1998	Site visit by LANTDIV and VDEQ representatives.	Packages of unused needles wrapped in foil noted in drainage swale.
May 1998	Reactives Management, Inc. performs routine housekeeping activities to remove surgical debris. What was previously thought to be IV bags or bottles is determined to be IV injection sets.	Small quantity of unidentified injectable drugs also removed.
November 1999	Field Investigation	Surface soil, subsurface soil, and sediment samples collected.
September 2000	Draft Final Site Inspection Report, Site 4 and AOC 1	Recommends preparing an EE/CA.
Future Activities	Finalize screening-level ERA in October 2001. An EE/CA will be prepared to address site hazards. If necessary, a removal will be planned and documented in an action memorandum.	SI Report will be finalized in March 2001. EE/CA will be completed pending schedule determined by WPNSTA Partnering Team. If warranted, based on the findings of the 2001 Field Investigation, the Remedial Action process will be initiated.







**NOTES**  
 1) SAMPLES LOCATED BY GPS (BAKER, 11/99)  
 2) EDGE OF POND LOCATION APPROXIMATE

SOURCE: NAVFAC DRAWING 4255914 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 3".

LEGEND	
■	- DROP INLET
NF	- NOT FOUND
~~~~~	- OVERLAND FLOW DIRECTION
CMP	- CORRUGATED METAL PIPE
●	- HAND AUGER BORING LOCATION
□	- SEDIMENT SAMPLE LOCATION
—→	- DRAINAGE CHANNEL WITH FLOW DIRECTION

**FIGURE 4-4A**  
 LOCATIONS OF PREVIOUSLY COLLECTED SAMPLES  
 SITE 4  
 CTO - 0172  
 NAVAL WEAPONS STATION YORKTOWN  
 YORKTOWN, VIRGINIA  
 CHEATHAM ANNEX SITE

### **SITE 5 – PHOTOGRAPHIC CHEMICALS DISPOSAL AREA**

Outdated photographic chemicals (developers and fixers) were reportedly disposed in a pit, which was of unknown dimensions, in 1967 or 1968. Quantities mentioned included “20 to 40 gallons; or one pallet full, which was approximately six months’ accumulation.” This site was originally a “marl pit” located behind (southeast) of the old DuPont munitions factory area, near Second Street as shown on Figure 4-5. During the IAS investigation, hand-sketches mapping was prepared that showed site locations. The Photographic Chemicals site is shown on the south end of Second Street and not at the location shown on the final IAS figures.

The IAS concluded that based on the small quantity and the non-hazardous nature of the chemicals that were disposed, further study was not warranted (NEESA, 1984).

A summary of significant environmental actions/activities to date for Site 5 is presented on Table 4-5.

#### **Status of Site 5 – Photographic Chemicals Disposal Area**

In June 1998 Baker and LANTDIV representatives visited the location of Site 5 and reconnoitered the area to locate the site. No signs of contamination, distressed areas, or evidence of the disposal pit could be seen. Based on the small quantity of the chemicals that were reportedly disposed and the lack of evidence of contamination, the site is not considered to be a significant source of contamination.

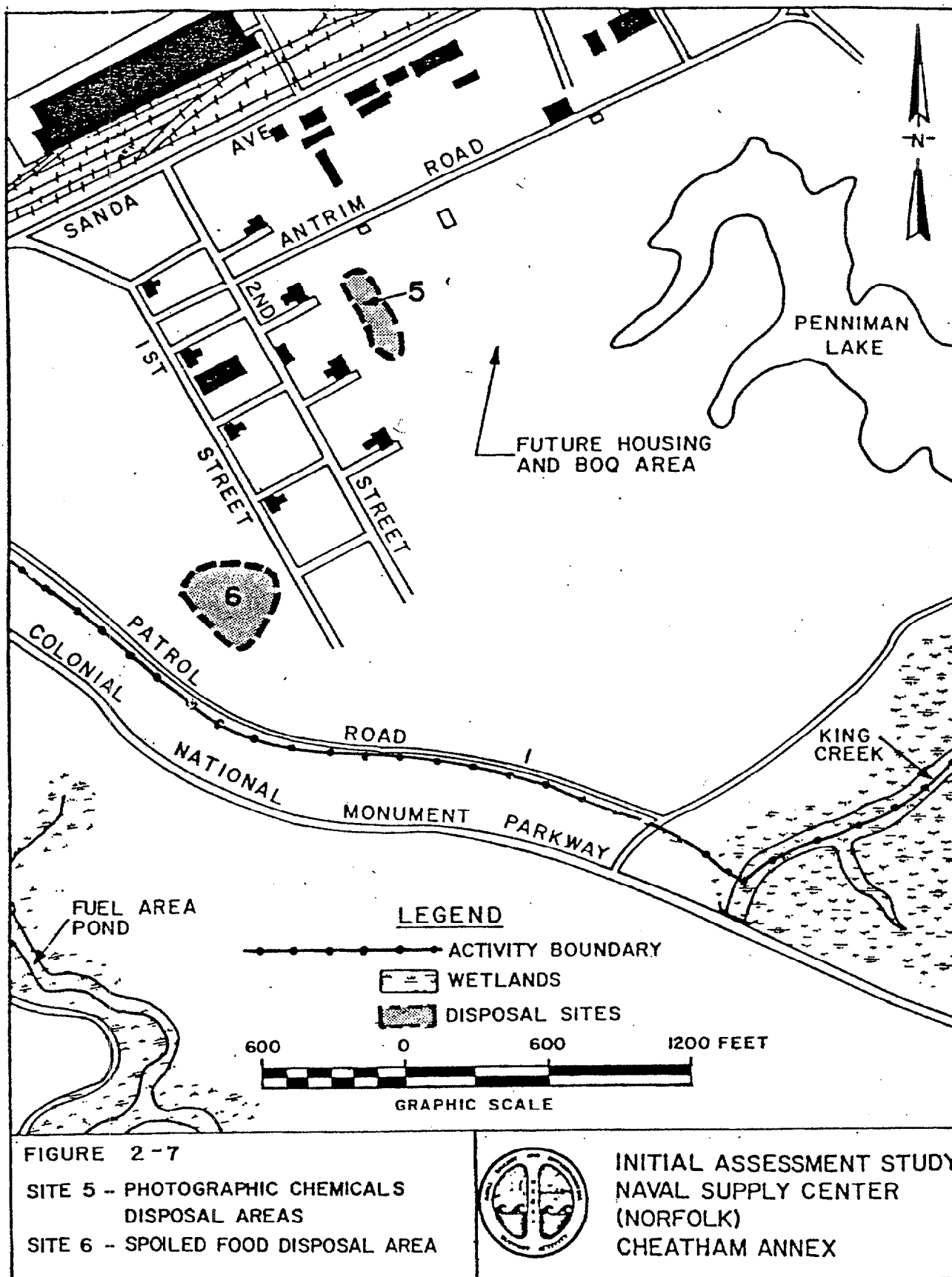
#### **Future Activities Planned for Site 5 – Photographic Chemicals Disposal Area**

The VDEQ has requested that attempts be made to locate the site. Future activities at this site are not planned unless new information regarding sources of contamination is discovered.

**TABLE 4-5**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 5 – PHOTOGRAPHIC CHEMICALS DISPOSAL AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 5 – PHOTOGRAPHIC CHEMICALS DISPOSAL AREA</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1967 or 1968	Outdated photographic chemicals (developers and fixers) reportedly disposed in pit.	Quantity reported to be 20 to 40 gallons, or one pallet full.
1984	IAS (NEESA)	Recommends no further study due to the non-hazardous nature and small quantity of the chemicals.
June 1998	Baker and LANTDIV visit area. Site can not be located.	No signs of contamination observed.
Future Activities	No future activities planned.	VDEQ has requested that LANTDIV attempt to locate the site.



NOTE:

1. This figure was reproduced from Figure 2-7 from the IAS Report (NEESA, 1984)

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**FIGURE 4-5**  
 SITE PLAN - SITE 5  
 CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
 YORKTOWN, VIRGINIA  
 CHEATHAM ANNEX SITE

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### **SITE 6 – SPOILED FOOD DISPOSAL AREA**

Site 6 is located to the west of the old DuPont ammunition factory as shown in Figure 4-6. Reportedly, approximately 750 cubic yards of food spoiled in cold storage was buried in a 12 to 15 foot deep pit around 1970. Disposal was not ongoing, and the spoiled food had no hazardous properties. The site was overgrown at the time of the IAS (NEESA, 1984).

The IAS concluded that additional study was not warranted for the site due to the non-hazardous condition of decomposed food.

A summary of significant environmental actions/activities to date for Site 6 is presented on Table 4-6.

#### **Status of Site 6 – Spoiled Food Disposal Area**

Based on the inert nature of the materials that were reportedly buried at Site 6, the site is not considered to be a significant source of contamination.

#### **Future Activities Planned for Site 6 – Spoiled Food Disposal Area**

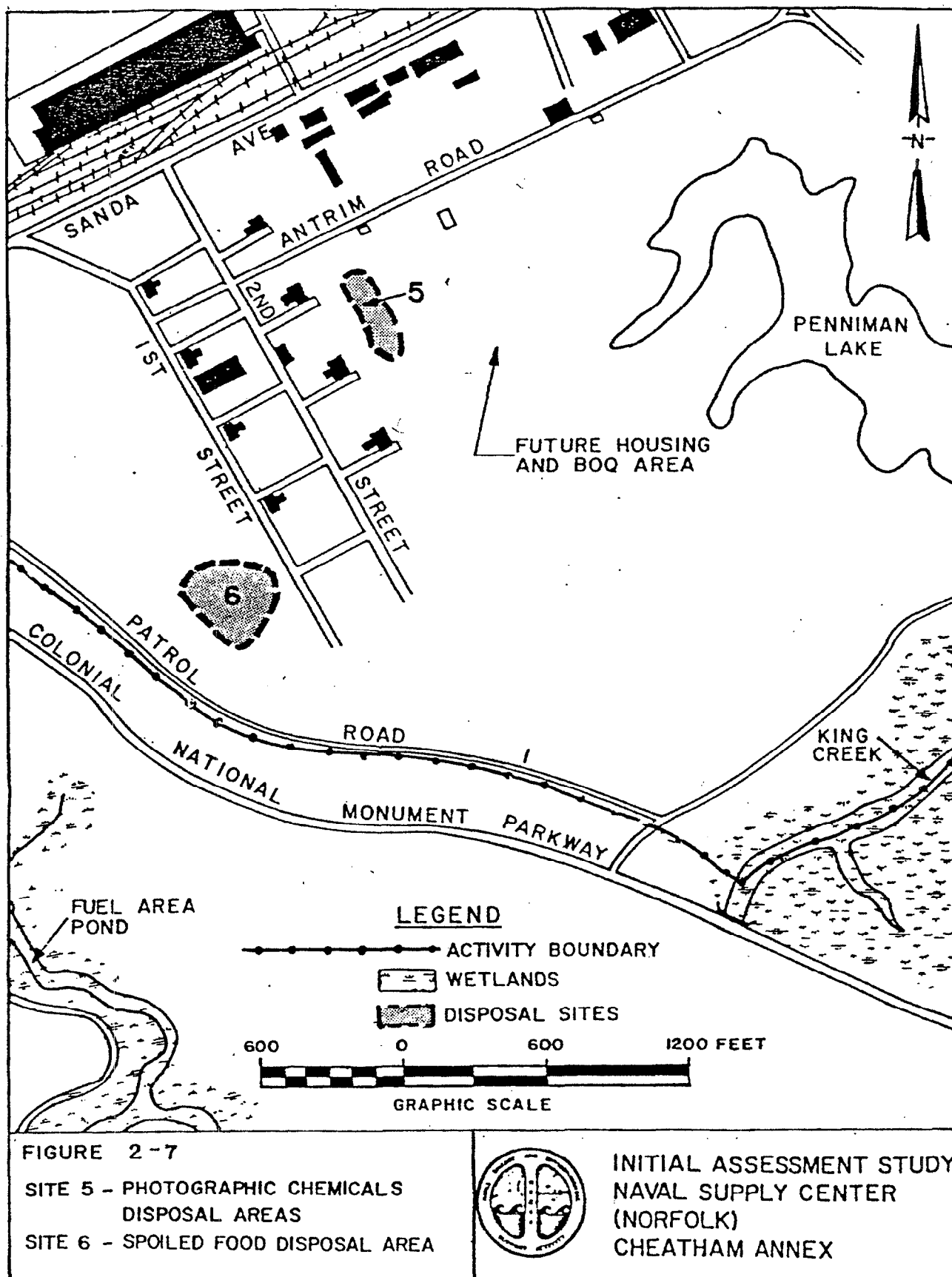
The VDEQ is seeking additional documentation/certification that only food was disposed at the site. If available, LANTDIV will provide such information. Future activities at this site are not planned unless new information regarding sources of contamination is discovered.

**TABLE 4-6**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 6 – SPOILED FOOD DISPOSAL AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 6 – SPOILED FOOD DISPOSAL AREA</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
Around 1970	Food spoiled in cold storage in a 12 to 15 foot deep pit.	750 cubic yards reportedly buried.
1984	IAS (NEESA)	Recommends no further study due to the non-hazardous nature of decomposed food.
Future Activities	No future activities planned.	If available, LANTDIV will provide documentation stating that only food was disposed at the site.





NOTE:

1. This figure was reproduced from Figure 2-7 from the IAS Report (NEESA, 1984)

**Baker**  
 Baker Environmental, Inc.

**FIGURE 4-6**  
 SITE PLAN - SITE 6  
 CTO - 0172  
 NAVAL WEAPONS STATION YORKTOWN  
 YORKTOWN, VIRGINIA  
 CHEATHAM ANNEX SITE

### SITE 7 - OLD DuPONT DISPOSAL AREA

In the past, there has been some confusion over the location of Site 7. The IAS report depicts the site behind two recreational cabins along the York River as shown on Figure 4-7. This location is also shown on Figure 1-3 (Site Location Plan) as "IAS location of Site 7." The Aerial Photographic Analysis (USEPA, 1998), which is also referred to as the EPIC Study, depicts a possible location for Site 7 along Queen Creek, approximately 2,000 feet west of Cheatham Pond. For this location (shown on Figure 1-3 as "EPIC location of Site 7"), the EPIC Study reports that a possible large, old dump was observed adjacent to Queen Creek in the 1937 photograph with an access road leading from the Penniman Plant to the possible dump. No additional descriptions for this location are presented on the subsequent photographs. The third possible location for Site 7 is along the York River, approximately 500 feet south of the IAS location. During a December 8, 1997, site visit with representatives of VDEQ, USEPA, LANTDIV, CAX and Baker, Mr. Butch Hogge (CAX) identified this area as the actual location of Site 7. This location is depicted on Figures 1-3 and 4-7. The EPIC study shows this location as an excavation area beginning in 1955 with vegetation re-established in 1975. The area is comprised of a flat, sparsely vegetated depression, with a berm along the northern perimeter. Gravel and ballast rock can be seen on the ground surface. To the east of the flat area, the land drops off slightly and in a very small area along the perimeter buried debris (pipe, metal, wood) can be seen outcropping from edge of the slope. The nature of the debris indicates that the disposal occurred more recently than the World War I era. On August 30, 1999 representatives of the VDEQ, LANTDIV, and Baker visited the three possible locations. No evidence of disposal was noted at either the IAS or EPIC location.

According to the IAS (NEESA, 1984), Site 7 (IAS location) received wastes from the City of Penniman and from the DuPont facility. The wastes were reported to be non-hazardous and/or inert. However, specific information documenting the types and quantities of wastes was not available. E.I. DuPont de Nemours and Company was contacted during the IAS, but specific information regarding disposal practices was not available. The surface of the site was described as level and supporting a variety of grasses. No evidence of stressed vegetation was noted during the IAS. The western, northern, and eastern boundaries of the site are clearly defined by steep banks rising an estimated 10 to 20 feet in elevation. This description indicates that the IAS location is actually the current site location, with the location of the site plotted incorrectly on the IAS mapping. The IAS also indicates that ammunition waste was disposed at the site -- it is not clear how this determination was made.

In November 1999 a Field Investigation was conducted at Site 7 to verify the presence of a debris disposal area. One sediment sample was collected from the low lying area to the east of the bermed area. Ten test pits were excavated to confirm the presence of buried debris. Results from the investigation are summarized in the Draft Final Field Investigation Report (Baker, 2000f). The test pit investigation revealed that debris is buried in the northern portion of the site. Aroclor-1260 was detected in the sediment sample. The Field Investigation Report recommended a follow-up investigation to characterize and define the lateral extent of the debris, determine the source of the PCB detection and assess the impact (if any) to soil, groundwater, and sediment. Based on the findings of the investigation, it is recommended that an EE/CA be completed to determine the appropriate management strategy for the site.

During a site visit by representatives from the Navy and USEPA in August 2000, a fourth location for the disposal area was discovered. At this time, concrete and metal surface debris was found in the wooded area between the recreational cabins and the York River. Debris was also found along a portion of the shoreline of the York River. Based on the location and type of debris found in this area (e.g., pieces of charred, melted glass and engine parts from the World War I era), it is believed that this fourth location is in fact the site that received wastes from Penniman and the DuPont Facility.

This area has been designated Site 13 (Penniman Disposal Area) and will be addressed under a separate investigation.

Samples collected during the 1999 Field Investigation are tabulated on Table 4-7, and locations are depicted on Figure 4-7A. A summary of significant environmental actions/activities to date for Site 7 is presented on Table 4-7A.

#### **Status of Site 7 – Old DuPont Disposal Area**

LANTDIV recognizes that sources of contamination may be present at the site. Further investigation and possible removal of sources of contamination may be required. Buried debris was encountered in a limited area during the 1999 Field Investigation.

#### **Future Activities Planned for Site 7 – Old DuPont Disposal Area**

Future planned activities for Site 7 include:

- Finalize Field Investigation Report (Site 7 and AOC 2) summarizing findings of the investigation (March 2001)
- LANTDIV will develop a strategy for Site 7 pending completion of the Field Investigation Report. Further investigations/activities at this site have not been funded.

**TABLE 4-7**

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
SITE 7 – OLD DuPONT DISPOSAL AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

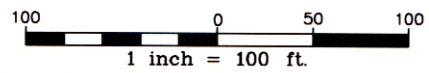
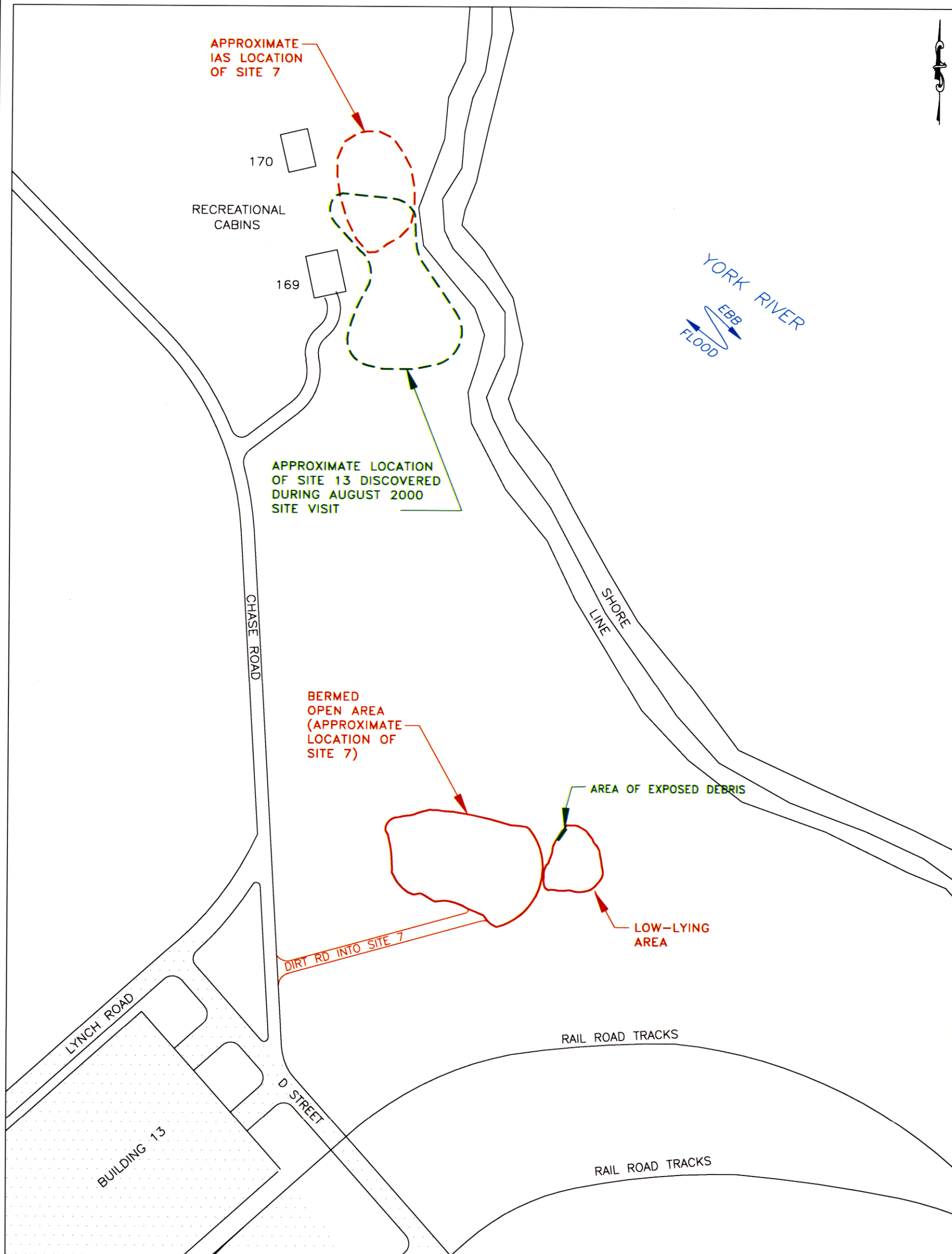
<b>Sample ID</b>	<b>Media</b>	<b>Analytical Parameters</b>
<b>NOVEMBER 1999 FIELD INVESTIGATION</b>		
7-SD01	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide

Notes:

TCL = Target Compound List

TAL = Target Analyte List

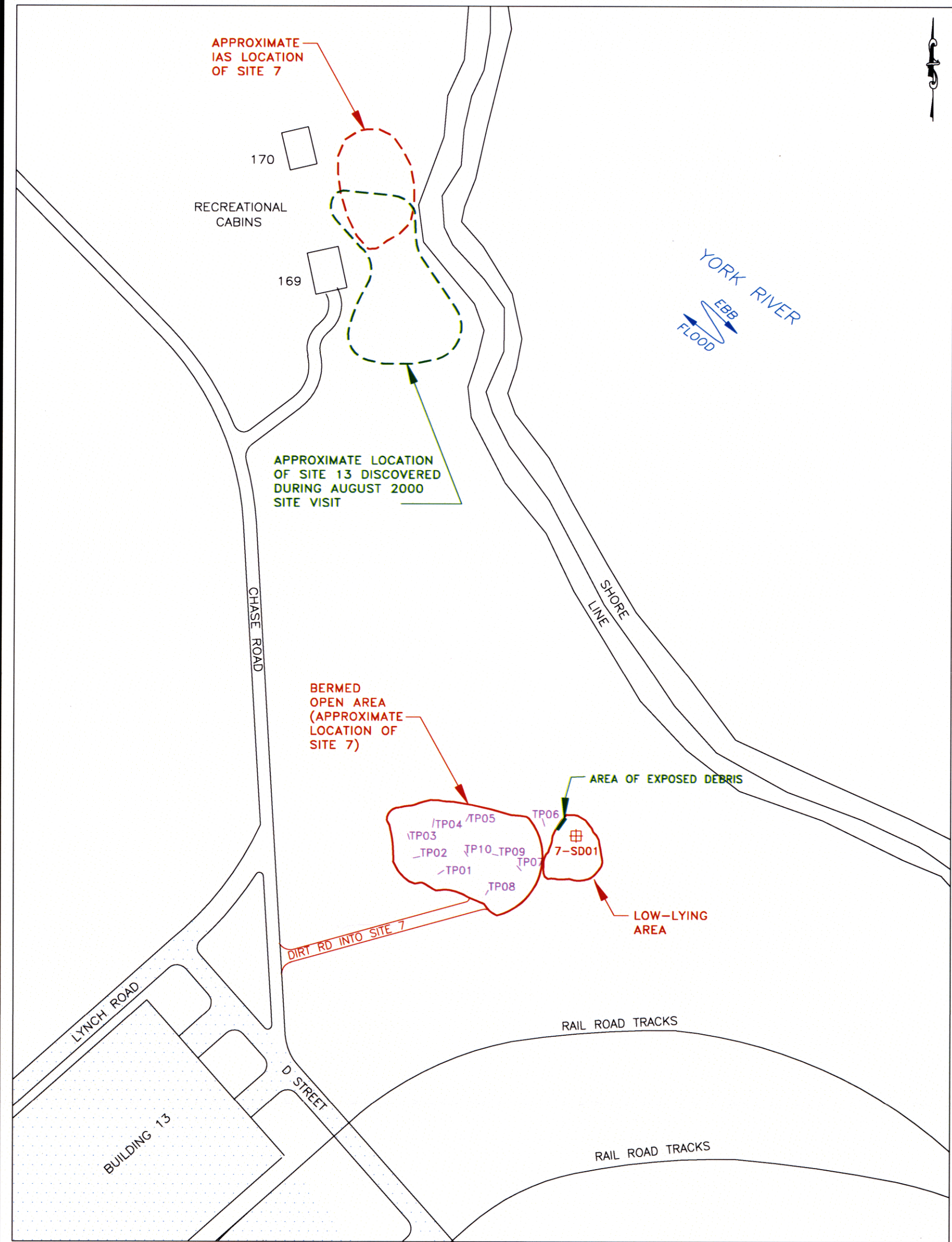
Quality Assurance/Quality Control (QA/QC) Samples are not listed.



**LEGEND**

**FIGURE 4-7  
SITE PLAN - SITE 7  
CTO - 0172**





K:\26007\172PHASE\GRAPHICS\CAD\2172704W

100 0 50 100  
1 inch = 100 ft.

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#### LEGEND

- TEST PIT LOCATION (APPROX.)
- ⊞ SEDIMENT SAMPLE LOCATION (APPROX.)

SOURCE: NAVFAC DRAWING 4255912 "STORMWATER DRAINAGE DESIGNATION DRAWING-SECTOR 1"

#### FIGURE 4-7A SAMPLE LOCATION PLAN SITE 7

CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



### **SITE 8 – LANDFILL NEAR BUILDING CAD 14**

Site 8 is located approximately 300 feet north of Building CAD 14 and is estimated to be less than ¼ acre in size. The approximate location of the site is shown on Figure 4-8. The disposal area reportedly consisted of a series of trenches with typical surface areas of 2,000 feet and depths of 10 feet. The site was used at various times since the early 1940s. The site was most active prior to the opening of the Landfill near the Incinerator (Site 1). It was reported that the site was used for waste disposal as recently as 1980.

Specific information documenting disposal practices is not available. Reportedly, only non-hazardous materials such as spoiled meat, spoiled candy, and clothing have been disposed at the site.

The surface of the site is level and overgrown with tall grasses, and at the time of the IAS, there was no surface evidence of waste and no stressed vegetation was present.

The IAS concluded that additional study was not warranted for the site due to the non-hazardous nature of the wastes disposed at the site (NEESA, 1984).

A summary of significant environmental actions/activities to date for Site 8 is presented on Table 4-8.

#### **Status of Site 8 – Landfill near Building CAD 14**

Based on the inert nature of the materials that were reportedly buried at Site 8, the site is not considered to be a significant source of contamination.

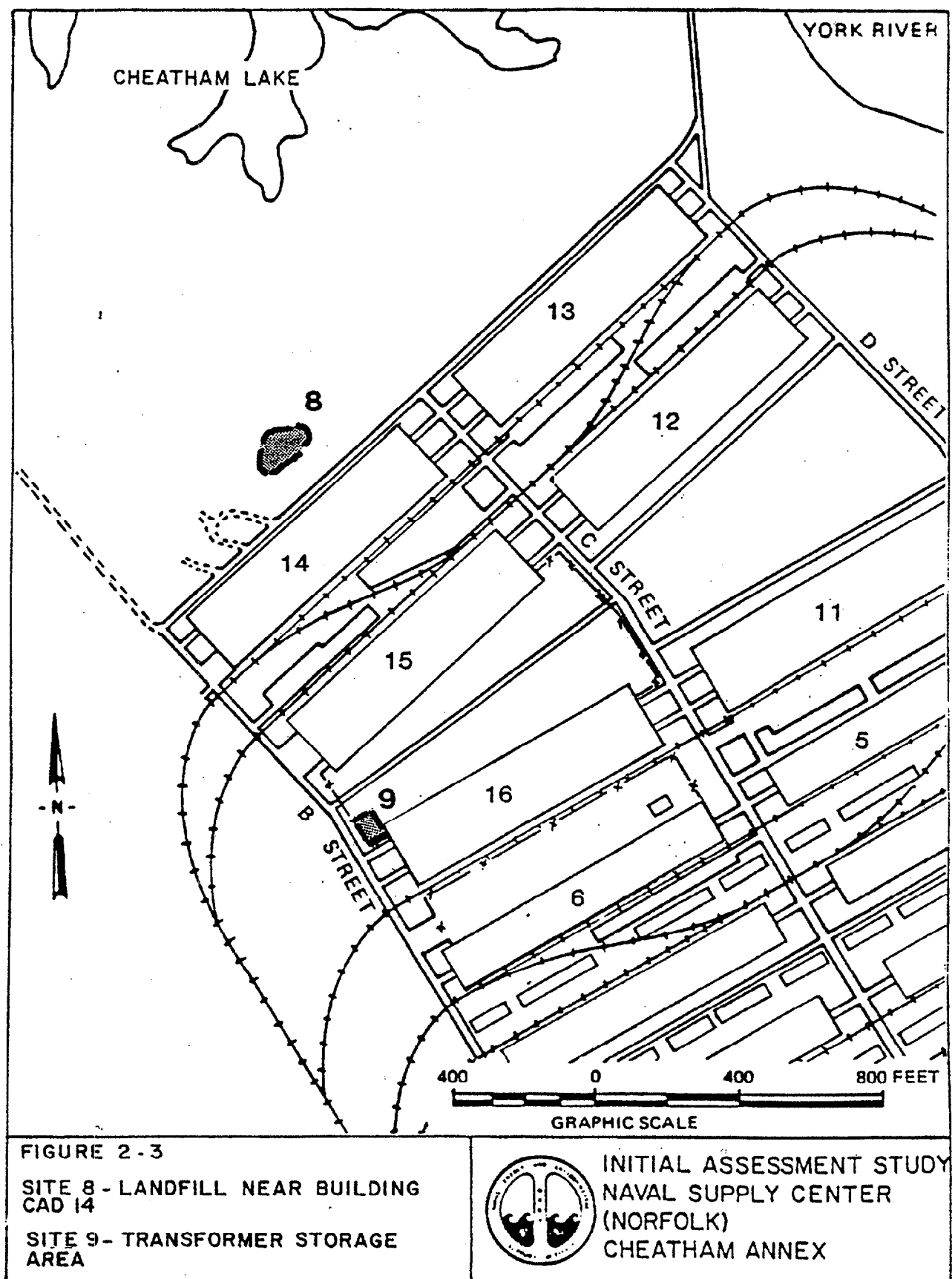
#### **Future Activities Planned for Site 8 – Landfill near Building CAD 14**

The VDEQ is seeking additional documentation/certification that only food and other inert materials were disposed at the site. If available, LANTDIV will provide such information. Future activities at this site are not planned unless new information regarding sources of contamination is discovered.

**TABLE 4-8**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 8 – LANDFILL NEAR BUILDING CAD 14  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 8 – LANDFILL NEAR BUILDING CAD 14</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
Early 1940s to 1980	Site used at various times for disposal of non-hazardous materials such as spoiled meat, spoiled candy, and clothing.	Site most active prior to the opening of the Landfill near Incinerator (Site 1).
1984	IAS (NEESA)	Recommends no further study due to the non-hazardous nature of the wastes disposed at the site.
Future Activities	No future activities planned.	If available, LANTDIV will provide documentation stating that only food and other inert materials were disposed at the site.



**NOTE:**

1. This figure was reproduced from Figure 2-3 from the IAS Report (NEESA, 1984)

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**FIGURE 4-8**  
**SITE PLAN - SITE 8**  
**CTO - 0172**  
**NAVAL WEAPONS STATION YORKTOWN**  
**YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

01216 I09Z

## SITE 9 – TRANSFORMER STORAGE AREA

This site is approximately 7,000 square feet in size and located adjacent to the northwest corner of Building CAD 16 as shown on Figure 4-9. Between 1973 and 1980, electrical transformers, some of which contained PCBs were reportedly stored at the site. These transformers were awaiting repair or disposal. Between six and thirty transformers were stored at the site at a time. The storage area surface was exposed soil enclosed by an earthen containment wall. Information regarding the number of leaking transformers, the volume of PCB oil stored or spilled is not known. If the transformers had small leaks, the total volume of transformer oil leaked was likely to be less than one gallon. The total volume could be much greater if oil was spilled (as opposed to leaked). Transformers were no longer stored at the site after 1980 and the area was graded and covered with gravel (NEESA, 1984).

The IAS recommended additional study due to the potential for PCB contamination. The Confirmation Study Step 1A (Verification), Round One (Dames and Moore, 1986) included collection of 13 soil samples from Site 9 for analysis of PCBs and 2,3,7,8- Tetrachlorodibenzo-p-dioxin (TCDD). Sample locations are shown on Figure 4-9A. The sampling program is summarized on Table 4-9. Arochlor 1260 was the only PCB congener detected (eight of 13 samples). TCDD was not detected in any samples. Detected concentrations of Arochlor 1260 ranged from 21 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) to 321  $\mu\text{g}/\text{kg}$  (or 0.021 ppm to 0.321 ppm). The report recommended determining the PCB concentration of oil that was previously used in the transformers stored at the site. No additional sampling was recommended due to the low levels of the detections (as compared to the lowest action level under the Toxic Substance Control Act [TSCA] of 1.0 ppm).

A Draft Final NFRAP Decision Document was submitted for the site in December 1999. The document was reviewed by the VDEQ and USEPA and further investigation and an ecological risk assessment were recommended. Further discussion is required to determine the action to be taken at this site.

A summary of significant environmental actions/activities to date for Site 9 is presented on Table 4-9A.

### Status of Site 9 – Transformer Storage Area

The levels of PCBs detected in soil samples collected under the Confirmation Study Step 1A (Verification), Round One (Dames and Moore, 1986) are well below the lowest action level of 1.0 ppm under TSCA. Based on this, the site was proposed for NFRAP status. However, additional investigation and an ecological risk assessment were recommended. Further discussion is required to determine the action to be taken at this site.

### Future Activities Planned for Site 9 – Transformer Storage Area

Future planned activities for Site 9 include:

- Finalization of a NFRAP decision document (pending completion of screening-level ERA)
- Finalize Screening-Level ERA Report (October 2001)

**TABLE 4-9**

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
SITE 9 – TRANSFORMER STORAGE AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>Sample ID</b>	<b>Media</b>	<b>Analytical Parameters</b>
<b>1986 CONFIRMATION STUDY</b>		
9S01 through 9S13	Surface Soil	PCBs and TCDD

Notes:

Quality Assurance/Quality Control (QA/QC) samples not listed

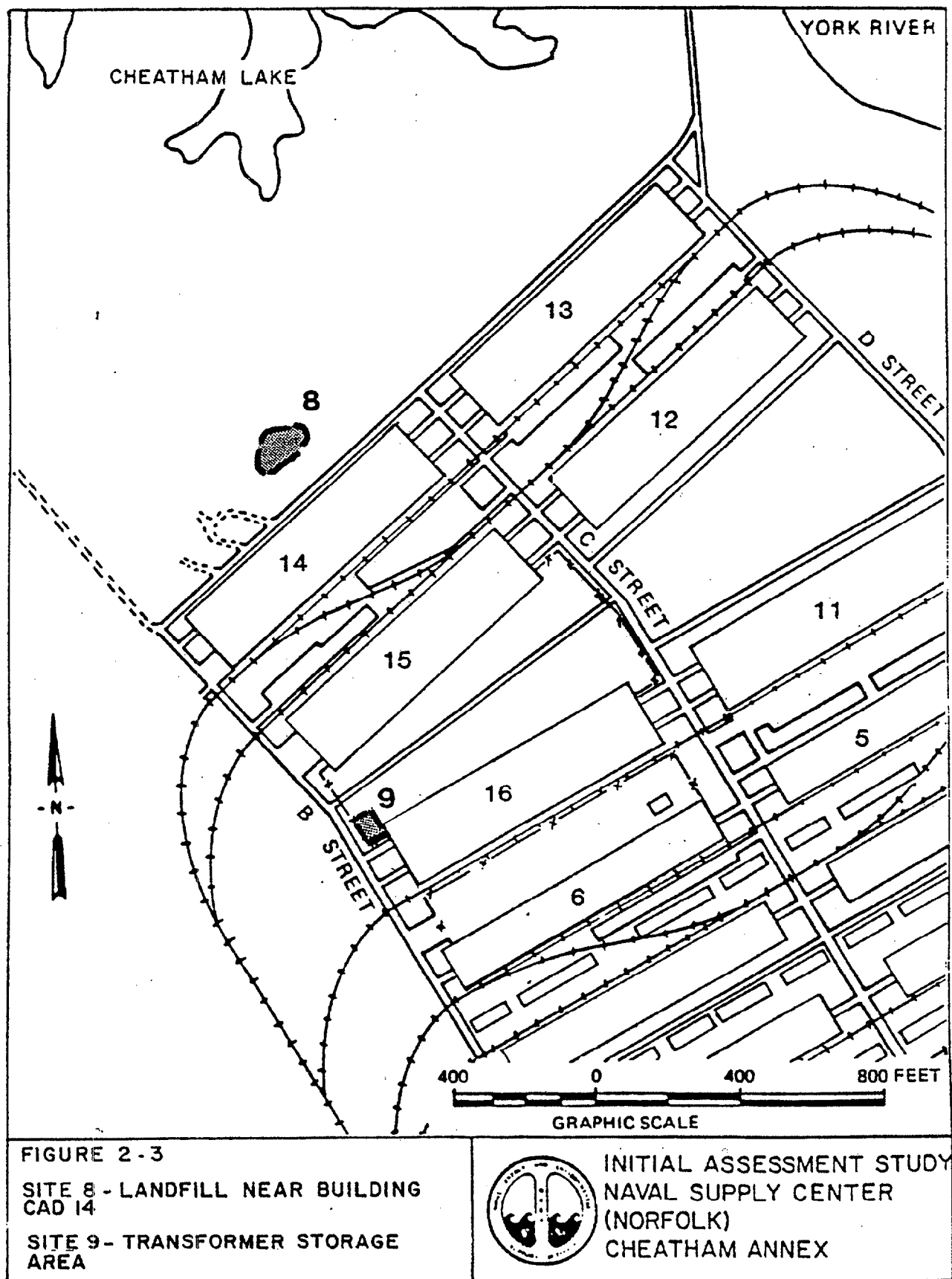
PCB - Polychlorinated biphenyls  
TCDD - 2,3,7,8-Tetrachlorodibenzo-p-dioxin

**TABLE 4-9A**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 9 – TRANSFORMER STORAGE AREA  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 9 – TRANSFORMER STORAGE AREA</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1973 to 1980	Electrical transformers awaiting repairs or disposal stored at site.	Some transformers may have had leaks. Spills may have occurred. As of 1980, transformers no longer stored at site, site regraded and covered with gravel.
1984	IAS (NEESA)	Recommends additional study due to the possibility of PCB contamination.
1986	Confirmation Study, Step 1A Verification (Round One) (Dames and Moore)	Thirteen soil samples collected. Highest detection of PCB is 321 µg/kg, which is below lowest action levels. No further investigations or actions recommended.
December 1999	NFRAP decision document.	Agency comments recommend additional investigation and ecological risk assessment.
Future Activities	Finalize screening-level ERA in October 2001. Additional future activities depend on results of response to Agency comments.	Additional activity at site pending.





NOTE:

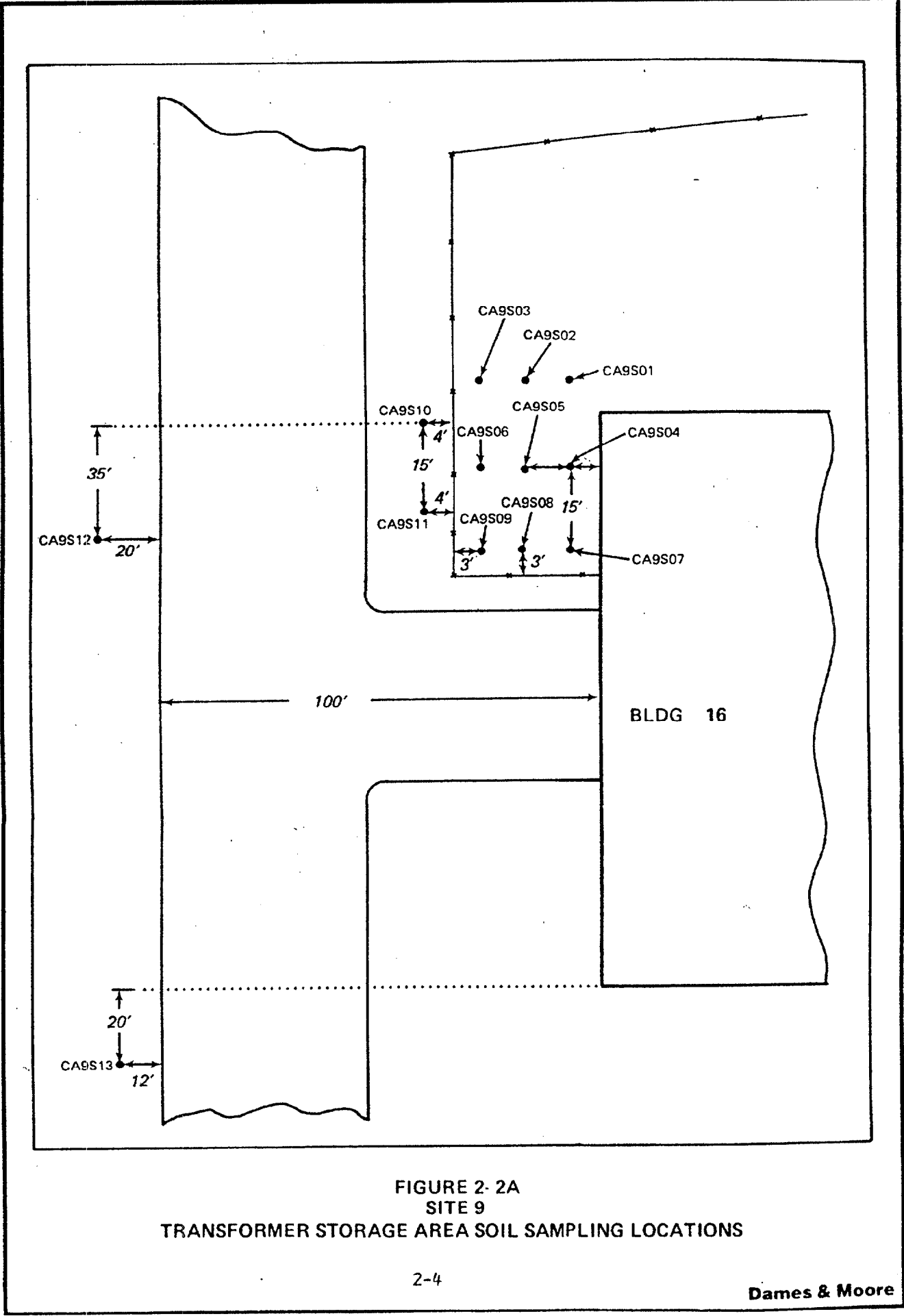
1. This figure was reproduced from Figure 2-3 from the IAS Report (NEESA, 1984)

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FIGURE 4-9  
SITE PLAN - SITE 9  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



NOTE:

1. This figure was reproduced from Figure 2-2A from the Confirmation Study Step 1A (Verification), Round One Report (Dames and Moore, 1986)

## **SITE 10 – DECONTAMINATION AGENT DISPOSAL AREA NEAR FIRST STREET**

Site 10 is located south of First Street in the southernmost part of the old DuPont munitions plant. A site plan is presented as Figure 4-10. An estimated 75 to 100 gallons of decontamination agent (DS-2) was reportedly buried at the site. No information specifying the time of waste burial was specified. However, from site conditions at the time of the IAS, at least two years had elapsed since burial (i.e., burial occurred prior to 1982). DS-2, which is toxic to humans and corrosive to metals, is used for decontaminating equipment contaminated with nerve or blister agents. DS-2 is comprised of 70% diethylene triamine; 28% ethylene glycol monomethyl ether; and 2% sodium hydroxide. It is not known if the DS-2 was neutralized prior to disposal.

At the time of the IAS, the surface of the site was covered with a variety of grasses. No evidence of stressed vegetation was noted and surrounding vegetation and animal life showed no visible adverse effects.

Due to the potential presence of DS-2, the IAS recommended that a magnetometer survey be performed to locate metallic containers of DS-2. Once the existence and location of the containers was confirmed, it was recommended that the containers be excavated and their contents be determined. If leaking containers were discovered, groundwater sampling was recommended (NEESA, 1984).

A magnetometer survey of Site 10 was performed in December 1985 (Geosight, 1985). The results are plotted on Figure 4-10A. The map shows the anomalous areas in terms of equivalent pounds of iron. While the source of the anomalies may indeed be buried metal, brick, slag, ash, or other disturbances could also be the source of the anomalies. The mounds of soil present in the wooded area appeared to contain little iron. The magnetometer survey was summarized in the Final Remedial Investigation Interim Report (Dames and Moore, 1991). The report recommended that historical aerial photographs be reviewed to ascertain additional information about the disposal activities and that a risk assessment be performed.

The Site Investigation for Site 10 was performed in 1992 (Weston, 1994). During the investigation, approximately 20 to 25 small bottles (3 inches high) were found on the edge of the wooded area. The bottles each contained a small volume of unidentified, dry yellow/brown material. The nature and contents of the bottles was not known.

As part of the Site investigation, three monitoring wells were installed within the shallow aquifer at the location shown on Figure 4-10B. One surface soil sample and three subsurface soil samples were collected from each monitoring well boring. Groundwater samples were collected from each well.

Three VOCs (methylene chloride, TCE, and acetone), and one SVOC (chrysene) were detected in soil at low concentrations (below applicable criteria). TPH levels were elevated in two surface soil samples. Levels of metals were typically near or below background levels.

TPH and SVOCs were not detected in groundwater. The VOC dichloropropane was detected in a duplicate sample at a level above the maximum contaminant level (MCL) but was not detected in any of the environmental groundwater samples. Acetone was detected at a low concentration. Dissolved mercury was detected at levels above the Virginia Groundwater Standards (VGS) in each of the wells but was not detected in any of the unfiltered samples.

The report concluded that the low levels of contamination in soil and groundwater did not appear to be related to DS-2 and were not suspected to be indicative of a significant source of contamination. In general, no clear evidence of drum disposal was found. Re-sampling of the monitoring wells for VOCs and mercury was recommended to confirm the Site Investigation results.

In 1997, as part of the SSP investigation Baker re-sampled the three Site 10 monitoring wells to confirm the Site Investigation results (Baker, 1997). No organic compounds were detected in groundwater. Dissolved manganese was the only inorganic detected at a concentration above the screening criteria. Mercury was not detected in any (filtered or unfiltered) samples. The SSP included human health and ecological risk screening using data generated under the SI (soil and groundwater) and under the SSP investigation (groundwater): no unacceptable risks were estimated and no additional investigation or remedial action was deemed necessary.

Samples collected to date at Site 10 are summarized on Table 4-10. A summary of significant environmental actions/activities to date for Site 10 is presented on Table 4-10A.

#### **Status of Site 10 - Decontamination Agent Disposal Area near First Street**

SI and SSP investigation sampling did not locate any significant sources of contamination at the site. The buried containers of DS-2 have not been located to date. Based on the results of these investigations and the relatively small volume of DS-2 that was reportedly buried, the site does not appear to pose a significant threat to human health or the environment.

#### **Future Activities Planned for Site 10 - Decontamination Agent Disposal Area near First Street**

Future activities at this site are not currently planned unless new information regarding sources of contamination is discovered. Based on the findings of previous investigations, the site is not considered to be a high priority for additional investigation/actions. NFRAP status for the site is not currently planned because the source of the detected anomalies has not been determined and the buried containers of DS-2 have not been located. Before the site can be closed out it will be necessary to perform a test pit investigation to identify the source(s) of the anomalies and determine if a removal action or additional remedial activities are warranted.

**TABLE 4-10**

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
SITE 10 - DECONTAMINATION AGENT DISPOSAL AREA NEAR FIRST STREET  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

Sample ID	Media	Analytical Parameters
<b>1992 SITE INVESTIGATION</b>		
10SB01-1A	Surface Soil 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB01-2A	Subsurface Soil 2-4 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB01-3A	Subsurface Soil 4-6 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB02-1A	Surface Soil 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB02-2A	Subsurface Soil 4-6 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB02-3A	Subsurface Soil 6-8 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB03-1A	Surface Soil 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB03-2A	Subsurface Soil 2-4 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10SB03-3A	Subsurface Soil 6-8 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
10GW01-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics
10GW02-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics
10GW03-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics



**TABLE 4-10 (Continued)**

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
SITE 10 - DECONTAMINATION AGENT DISPOSAL AREA NEAR FIRST STREET  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>Sample ID</b>	<b>Media</b>	<b>Analytical Parameters</b>
<b>1992 SITE SCREENING PROCESS</b>		
10GW01 through 10GW03	Groundwater	VOCs, SVOCs, pesticides/PCBs, total and dissolved inorganics

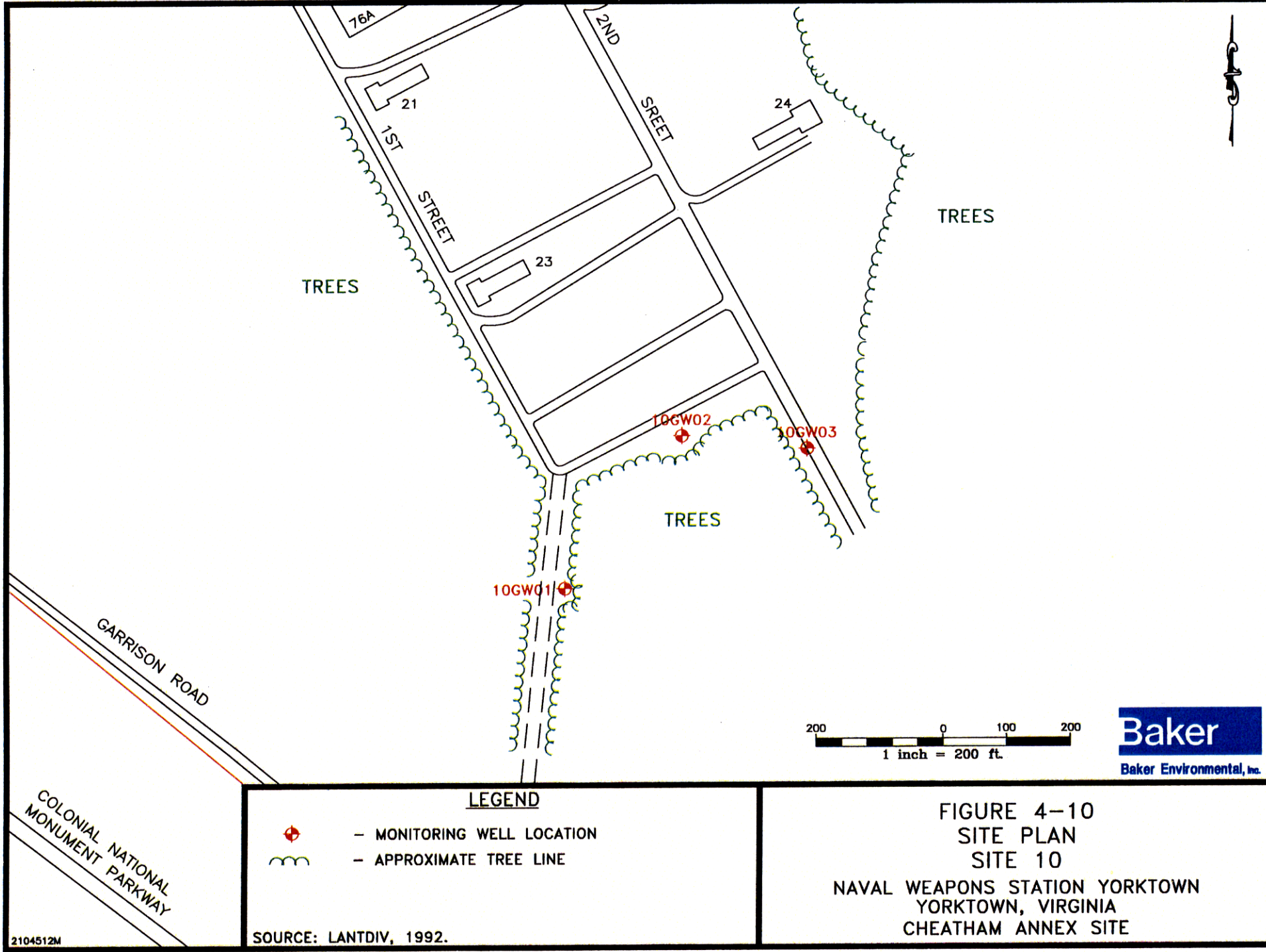
**Notes:**

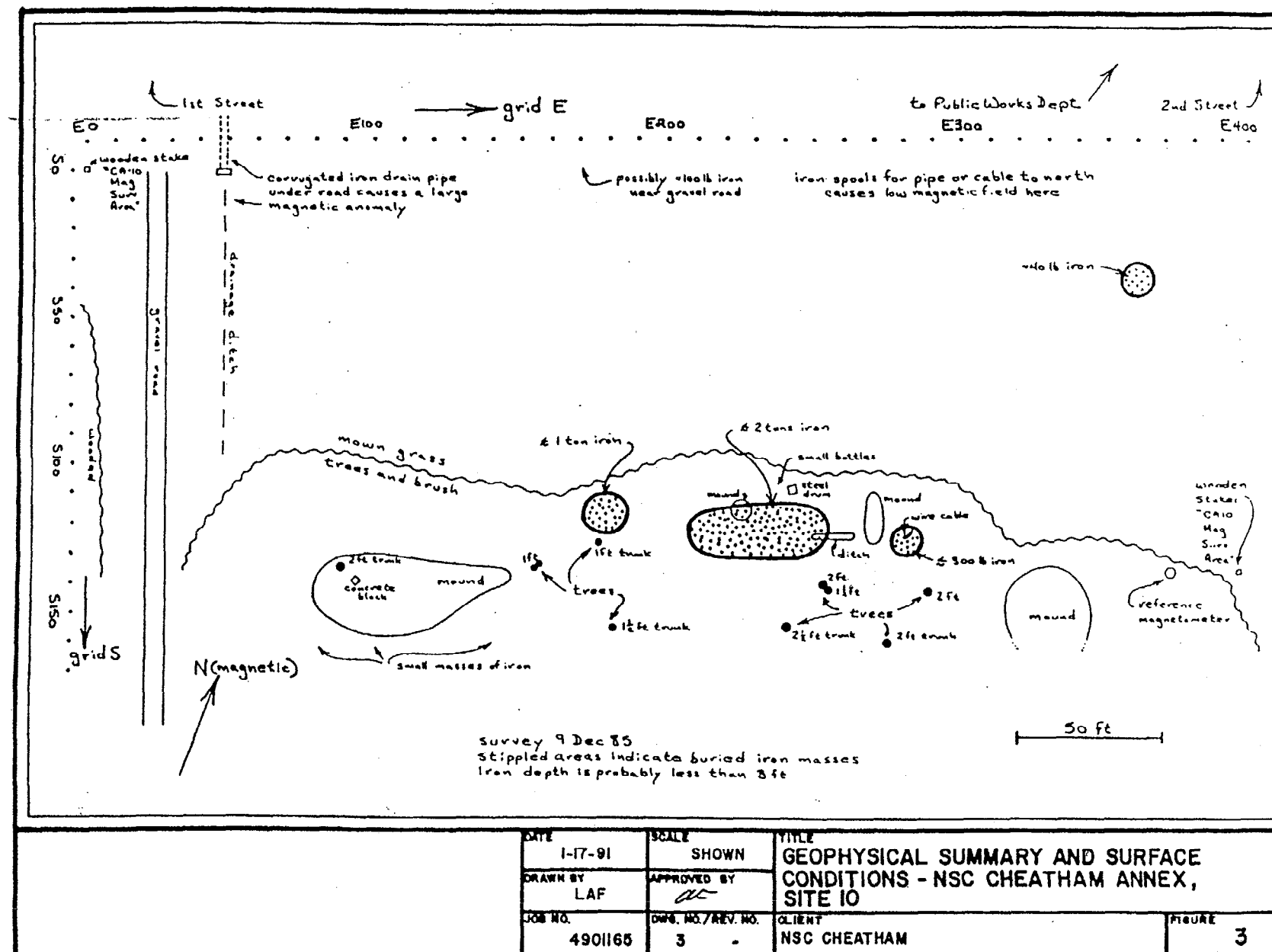
- bgs - below ground surface
- VOCs - Volatile organic compounds
- SVOCs - Semivolatile organic compounds
- TOC - Total organic carbon
- TPH - Total petroleum hydrocarbons

TABLE 4-10A

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 10 – DECONTAMINATION AGENT DISPOSAL AREA NEAR FIRST STREET  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 10 – DECONTAMINATION AGENT DISPOSAL AREA NEAR FIRST STREET</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
Prior to 1982	An estimated 75 to 100 gallons of DS-2 decontamination agent reportedly buried at the site.	Exact date and location of burial not known.
1984	IAS (NEESA)	Recommends a magnetometer survey to locate buried containers; and additional activities once containers are located.
December 1985	Magnetometer survey (Geosight)	Locates anomalic areas which are not positively identified as buried containers.
1991	Final RI Interim Report (Dames and Moore)	Summarizes Confirmation Study. Recommends additional RI efforts and risk assessment.
1994	Final Site Investigation Report (Weston)	Three monitoring wells installed (10-GW01, 10-GW02, and 10-GW03). Soil and groundwater sampled. Recommends confirmatory re-sampling of groundwater.
1997	Final Site Screening Process Report (Baker)	Additional round of groundwater samples collected from all three monitoring wells. No further action recommended.
Future Activities	No further activities currently planned.	Site not considered to be a high priority. Additional investigation will be performed to identify the sources of anomalies before the site can be closed out.





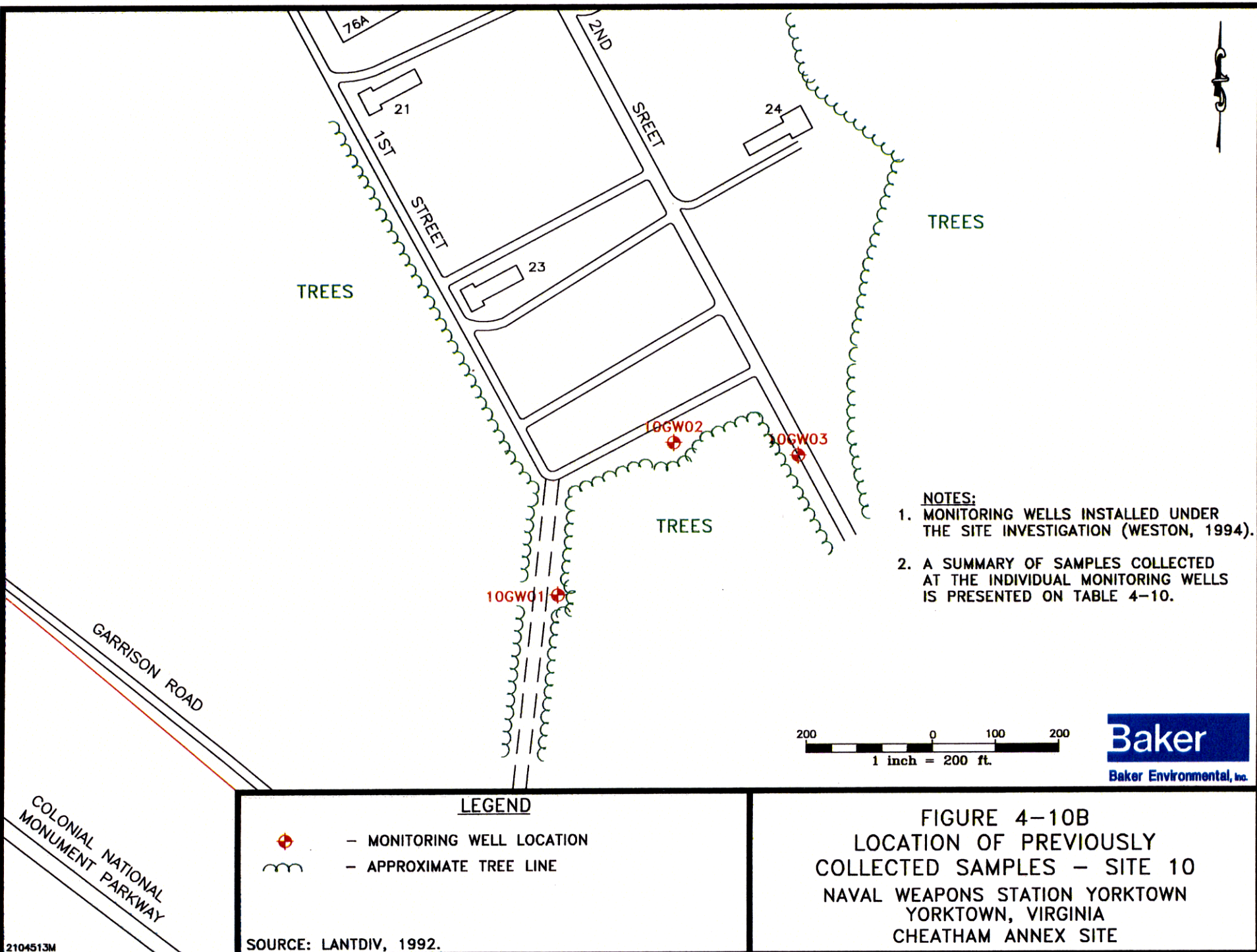
NOTE:

1. This figure was reproduced from Figure 3 of Appendix F of the Final Remedial Investigation Interim Report (Dames and Moore, 1991).
2. Geophysical Survey was performed by Geosight, December 1985.

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FIGURE 4-10A  
GEOPHYSICAL SURVEY RESULTS - SITE 10  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE





## **SITE 11 – BONE YARD**

Site 11 encompasses an estimated 8-acre area located approximately 250 ft south of Antrim Road, behind the public works facility (as shown on Figure 4-11). The site was reportedly used between 1940 and 1978. Wastes believed to be deposited at the site include oil, asphalt, and gasoline. These wastes were contained in 15 barrels and two 500-gallon above-ground tanks at the time of the IAS. It was reported that unspecified wastes may also be buried at the site.

During the IAS, scrap metal, old containers (fuel oil, mixing tanks, etc), fence posts, and abandoned cars were found inside the gate within an estimated 1-acre area. Various discarded clamshell buckets and other surplus metal objects used in heavy construction were also located throughout the area. Approximately ten 5-gallon containers labeled “paraplastic” (concrete sealant) were also present.

South of the entrance, numerous barrels containing petroleum products were discovered, as well as several 500-gallon square tanks containing asphalt or oil used in making asphalt. These tanks were reported to have leaked in the past.

Numerous tar cylinders were deposited at the end of the road leading into the site. The cylinders had apparently been there for quite a while, as their initial cardboard containers had decomposed and the tar had melted. Numerous pieces of scrap metal and surplus construction equipment were scattered along the path. It was also reported that uncharacterized wastes may have been buried in this area, but this was not confirmed by other reports or signs of stressed vegetation.

Based on descriptions from the IAS, the wastes deposited at this site have included oil, possibly from automobile maintenance and/or fuel oil sludge; gasoline; and asphalt oil from road maintenance supplies (NEESA, 1984).

Due to the presence of oil and gasoline at the site, and reported spills and waste burial, the IAS recommended additional study for Site 11.

The Confirmation Study Step 1A (Verification), Round One (Dames and Moore, 1986) included collection of three surface water and three sediment samples, and installation of three shallow monitoring wells. Groundwater samples were collected from each of the three monitoring wells. A total of nine soil samples were collected – one composite sample from each of the monitoring well borings, and six discrete samples were collected from locations throughout the site. A total of 18 samples were collected from 15 drums (three of the drums contained a liquid phase which was sampled). Confirmation Study sample locations are shown on Figure 4-11A. Previously collected samples are tabulated on Table 4-11.

The Confirmation Study Step 1A (Verification), Round Two (Dames and Moore, 1988) included collection of three surface water and three sediment samples co-located with the Round One samples, and collection of a second round of groundwater samples from each of the three monitoring wells which were installed during Round One.

The Final Remedial Investigation Interim Report (Dames and Moore, 1991) reported that most of the 55-gallon drums and scrap metal had been removed from the site since the IAS. This report, which characterizes the site as more of a scrap yard than burial site, summarized the findings of the Confirmation Study. Significant potentially site-related detections during the Confirmation Study included:

- Toluene, 111-TCE, phthalates, PAHs, oil and grease, and lead in soil
- Total phenols, lead, and oil and grease in groundwater
- 1,1,1 – TCE, methylethylketone, methylene-chloride (potentially laboratory-related), total phenols, and phthalates (potentially sampling-related) in surface water samples
- 1,1,1 –trichloroethane (TCA), lead, and oil and grease in sediment
- Leachable lead, cadmium, and barium (as indicated by [EP] toxicity testing) in drum samples

The report recommended the site for further investigation to better define the nature and extent of contamination at the site.

The Site Investigation for Site 11 (Weston, 1994) included a soil-gas survey, collection of 14 surface soil samples, installation of two monitoring wells with soil samples collected from each boring, collection of groundwater samples from the newly installed and existing monitoring wells, collection of 16 sediment samples from eight locations, and collection of five surface water samples. A general sample location plan for the Site 11 SI is presented as Figure 4-11B. Figures 4-11C and 4-11D show the locations of surface soil samples and soil-gas survey, respectively. Significant potentially site-related detections during the Site Investigation included:

- Low levels of benzene, toluene, ethylbenzene, xylenes, and total volatile hydrocarbons in soil-gas samples
- TCE, 1,1,1-TCA, toluene, xylene, PAHs, TPHs, lead and several other metals in surface soil
- TPHs, lead and other metals in subsurface soil
- TCE, 1,2 dichloroethene, carbon disulfide, lead and other metals in groundwater
- TCE, 1,2-dichloropropane, iron and manganese in surface water
- TPHs, PAHs, arsenic, beryllium, and lead in sediment

The Site Investigation concluded that previous activities at Site 11 have had some impact on shallow soils, marsh sediments, and lake sediments, but very little to no impact on groundwater and surface water. Potential for further degradation of the environment was minimal. The report recommended that the drums and asphalt tank remaining on site be removed. Confirmation of TCE detections in surface soil, VOCs and dissolved metals in groundwater, and TCE at one surface water sample location was also recommended.

The SSP investigation (Baker, 1997) included collection of an additional round of groundwater samples from each of the Site 11 monitoring wells. No organic compounds were detected. Concentrations of total (unfiltered) metals were significantly lower in the 1997 samples than in previously collected samples due to the employment of low-flow sampling during the SSP investigation. The SSP report concluded that no additional investigations be conducted at Site 11.

At the time of the SSP groundwater investigation (August 1997), approximately 60 drums were noted in the woods along with three tanks that contained tar. Approximately one half of the drums were empty. The remaining drums contained one or a combination of the following: tar, leaves, soil, or sludge. The location of the area containing the tar drums and tanks is shown on Figure 4-11. The drums and tanks were removed from the site in early September 1997 by Industrial Marine Services, Inc. of Norfolk, Virginia. The tar was solidified by adding sand prior to removal from the site. Approximately 60 tons of material, including drums, tanks, solidified tar, and miscellaneous scrap/materials was disposed as non-hazardous waste. Rainwater, which had accumulated in the largest tar tank, on top of the tar, was evacuated from the tank via vacuum truck and discharged to Industrial Marine Service's treatment facility at Norfolk, Virginia.

In November 1999, a Field Investigation was conducted at Site 11 to determine soil conditions within the area of the 1997 removal of tar drums/tanks. A total of six surface soil and six subsurface soil samples were collected. Figure 4-11E depicts the locations of the 1999 Field Investigation samples.

The Draft Removal Closeout Report (Baker, 2000a) summarizes removal activities that have occurred at Site 11 – Bone Yard. In November 1999, Baker conducted confirmatory sampling at Site 11 at the request of VDEQ. A RI/FS is planned for FY 2001. This effort (which has not been funded) will compile all existing data, fill data gaps, and include a human health risk assessment. The RI will provide recommendations regarding the need for additional actions at the site. The FS will select and describe the appropriate actions for the site. The multiple-site ecological risk assessment that is planned for CAX will have to be completed before RI recommendations can be formulated.

At the time of the previous investigations it was believed that the tar was previously used for roofing or paving. However, Baker has recently learned from anecdotal accounts that the site and surrounding area was the former location of a marine netting/cable coating operation.

A summary of the samples collected to date at Site 11 is presented on Table 4-11. A summary of significant environmental actions/activities to date for Site 11 is presented on Table 4-11A.

#### **Status of Site 11 – Bone Yard**

Previous investigations at Site 11 have not located any sources of significant contamination at the site. Previous removals and housekeeping activities have eliminated potential sources of contamination from the site.

#### **Future Activities Planned for Site 11 - Bone Yard**

Future planned activities for Site 11 include:

- Finalize the closeout report tabulating the results of the 1999 Field Investigation and documenting the 1997 housekeeping activities (pending agency comments).

- Finalize Screening-level ERA Report (October 2001)

No additional activities at this site are planned unless new information regarding sources of contamination is discovered. If warranted, based on the findings of the 1999 Field Investigation, the remedial action process will be initiated. In addition, a screening-level ERA will be conducted at Site 11.

TABLE 4-11

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**SITE 11 – BONE YARD**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

Sample ID	Media	Analytical Parameters
<b>STEP 1A – CONFIRMATION STUDY – ROUND 1 (1986) AND ROUND 2 (1987)</b>		
11S01 through 11S09 (1986)	Soil	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11GW01 (1986 & 1987)	Groundwater	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11GW02 (1986 & 1987)	Groundwater	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11GW03 (1986 & 1987)	Groundwater	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11SW01 (1986 & 1987)	Surface Water	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11SW02 (1986 & 1987)	Surface Water	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11SW03 (1986 & 1987)	Surface Water	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11SD01 (1986 & 1987)	Sediment	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11SD02 (1986 & 1987)	Sediment	VOCs, SVOCs, total phenols, oil & grease, and inorganics
11SD03 (1986 & 1987)	Sediment	VOCs, SVOCs, total phenols, oil & grease, and inorganics
Tank/Drum Content Sampling	NA	RCRA hazardous water characteristics including EP toxicity, reactivity, corrosivity, and ignitability
<b>1992 SITE INVESTIGATION</b>		
11SS01 through 11SS12	Surface Soil	VOCs, SVOCs, TOC, TPH, and inorganics
11SB04-1A	Surface Soil 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
11SB04-2A	Subsurface Soil 2-4 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
11SB04-3A	Subsurface Soil 6-8 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
11SB05-1A	Surface Soil 0-2 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
11SB05-2A	Subsurface 2-4 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
11SB05-3A	Subsurface Soil 4-6 ft bgs	VOCs, SVOCs, TOC, TPH, and inorganics
11GW01-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics
11GW02-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics

**TABLE 4-11 (Continued)**

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
SITE 11 – BONE YARD  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

Sample ID	Media	Analytical Parameters
<b>1992 SITE INVESTIGATION (continued)</b>		
11GW03-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics
11GW04-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics
11GW05-1A	Groundwater	VOCs, SVOCs, TOC, TPH, total and dissolved inorganics
11SW01 through 11SW05	Surface Water	VOCs, SVOCs, TOC, TPH, and total inorganics
11SD01-1A	Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD01-2A	Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD02-1A	Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD02-2A	Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD03-1A	Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD03-2A	Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD04-1A	Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD04-2A	Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH and inorganics
11SD05-1A	Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
11SD05-2A	Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics
11MS01-1A	Marsh Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
11MS01-2A	Marsh Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics



**TABLE 4-11 (Continued)**

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS  
SITE 11 – BONE YARD  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>Sample ID</b>	<b>Media</b>	<b>Analytical Parameters</b>
<b>1992 SITE INVESTIGATION (continued)</b>		
11MS02-1A	Marsh Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
11MS02-2A	Marsh Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics
11MS03-1A	Marsh Sediment 0-2 ft	VOCs, SVOCs, TOC, TPH, and inorganics
11MS03-2A	Marsh Sediment 2-3 ft	VOCs, SVOCs, TOC, TPH, and inorganics
SG-1 through SG-16	Soil	Soil Gas Survey Points
<b>1997 SITE SCREENING PROCESS INVESTIGATION</b>		
11GW01 through 11GW05	Groundwater	TCL organics TAL inorganics (filtered and unfiltered)
<b>1999 FIELD INVESTIGATION</b>		
11-HA01-00 through 11-HA06-00	Surface Soil 0-6 inches	TCL organics, nitramines, TAL inorganics and cyanide
11-HA01-02 through 11-HA06-02	Subsurface Soil 12-24 inches	TCL organics, nitramines, TAL inorganics and cyanide

**Notes:**

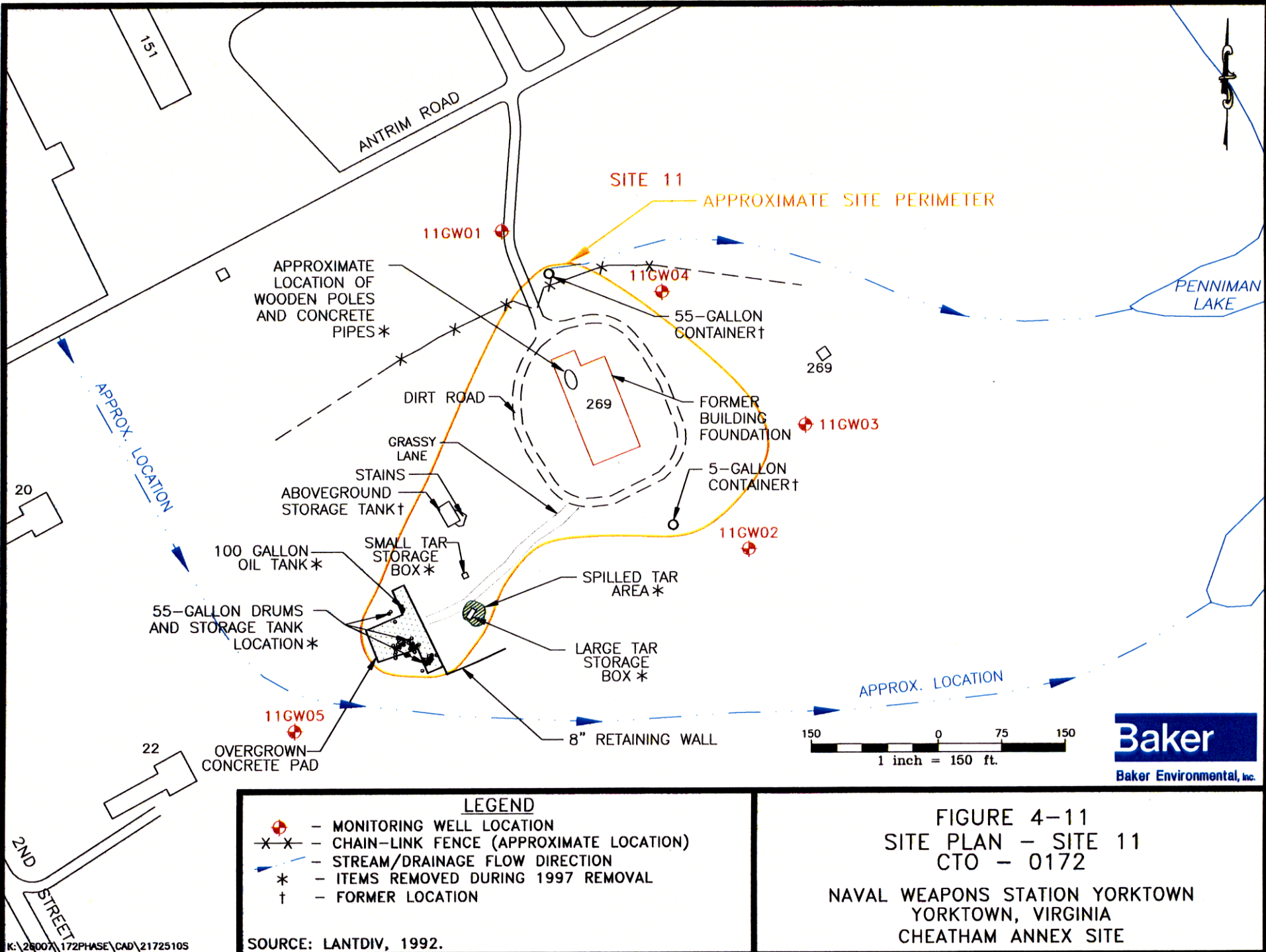
Quality Assurance/Quality Control (QA/QC) samples not listed

- bgs - below ground surface
- VOCs - Volatile organic compounds
- SVOCs - Semivolatile organic compounds
- TOC - Total organic carbon
- TPH - Total petroleum hydrocarbons
- PCB - Polychlorinated biphenyls
- RCRA - Resource Conservation and Recovery Act
- NA - Not Applicable

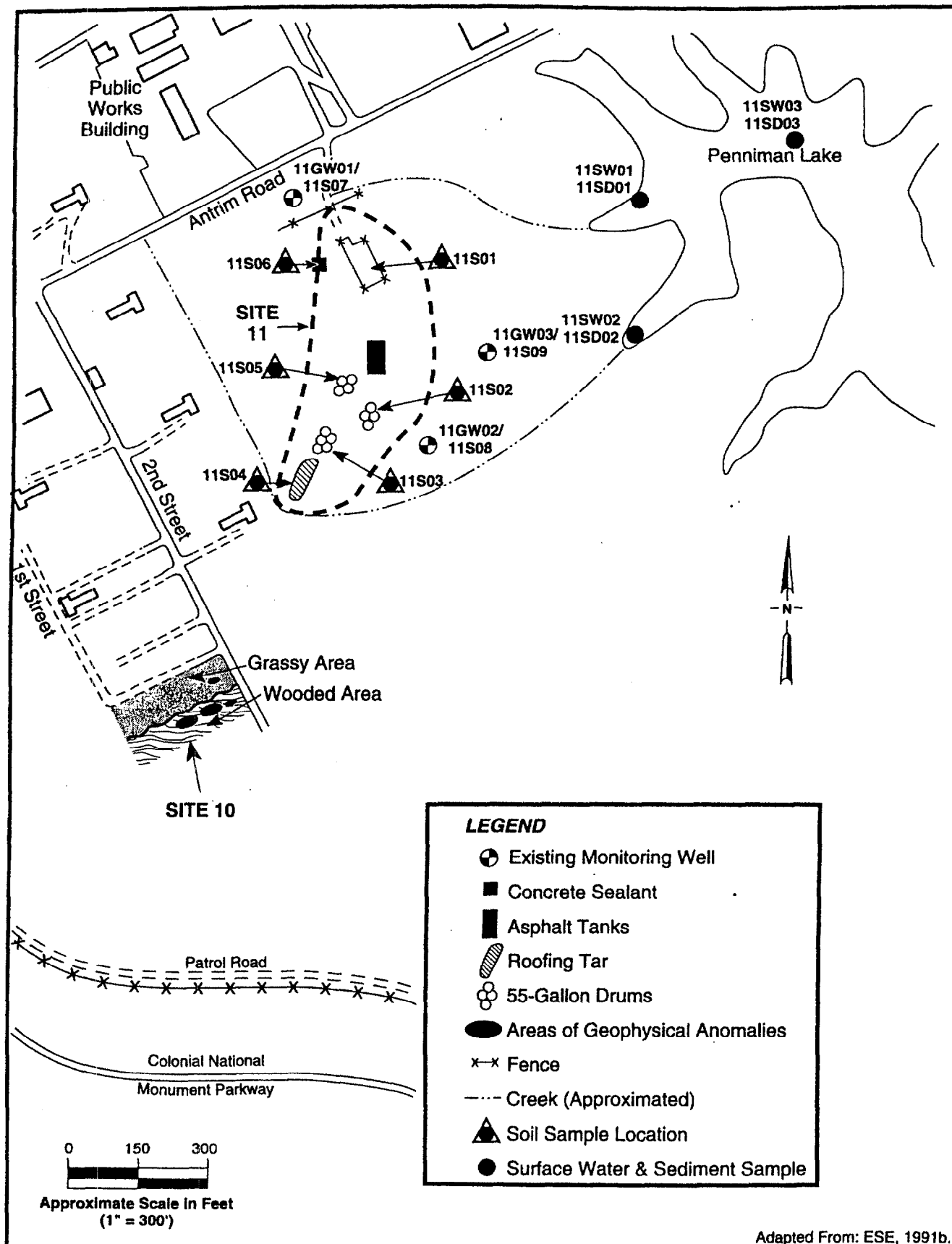
TABLE 4-11A

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 11 – BONE YARD  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

SITE 11 – BONE YARD		
DATE	EVENT	COMMENTS
1940 to 1978	Miscellaneous wastes stored at site	Waste consists of old containers, fuel oil, sludge, gasoline, asphalt, mixing tanks and various scrap.
1984	IAS (NEESA)	Recommends additional study in form of Confirmation Study due to the presence of oil and gasoline, and reported spills.
1986	Confirmation Study, Step 1A (Verification) Round One (Dames and Moore)	Three monitoring wells installed (11GW01, 11GW02, and 11GW03). Groundwater and soil samples collected from each well. Surface water, sediment, and drum samples also collected.
1987	Confirmation Study, Step 1A (Verification) Round Two (Dames and Moore)	Additional round of groundwater, surface water and sediment samples collected.
1991	Final RI Interim Report (Dames and Moore)	Summarizes Confirmation Study. Notes that majority of drums and scrap metal has been removed since the IAS. Recommends additional RI efforts.
1994	Final Site Investigation Report (Weston)	Two new monitoring wells installed (11-GW04 and 11-GW05). Soil gas survey performed and soil, groundwater, surface water and sediment samples collected. Recommends removal of tanks/drums and confirmatory resampling of soil, groundwater and surface water.
1997	Final Site Screening Process Report (Baker)	Additional round of groundwater samples collected from all five monitoring wells.
September 1997	IMS removes drums, tanks, and miscellaneous scrap from site	Removal performed as a housekeeping measure.
November 1999	Field Investigation	Collected surface soil and subsurface soil samples from area of 1997 housekeeping.
April 2000	Draft Removal Closeout Report	Summarizes removal activities.
Future Activities	Finalize screening-level ERA in October 2001. Closeout report from 1997 housekeeping.	Finalize closeout report (pending). Initiate remedial action if warranted (not funded or scheduled).



**WESTON**  
MANAGERS DESIGNERS CONSULTANTS



Adapted From: ESE, 1991b.

94P-6133 10/25/94

**FIGURE 1-4 PREVIOUS SAMPLE LOCATIONS,  
SITE 10 - DECONTAMINATION AGENT DISPOSAL AREA  
SITE 11 - BONE YARD**

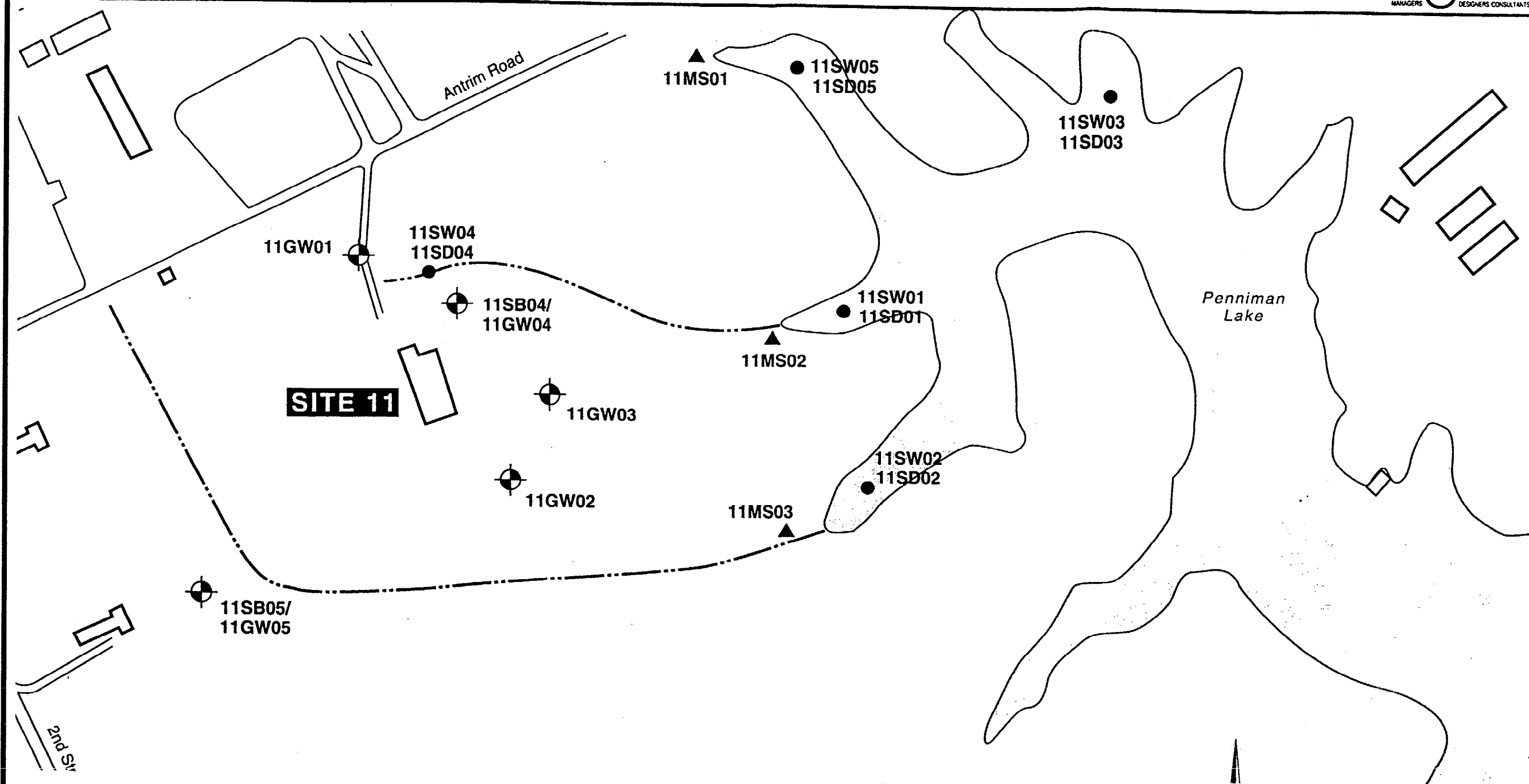
1-15

#### NOTES

- 1.) THIS FIGURE WAS REPRODUCED FROM FIGURE 1-4 FROM THE SITE INVESTIGATION REPORT (WESTON, 1994).
- 2.) THE CONFIRMATION STUDY WAS CONDUCTED BY DAMES AND MOORE. SAMPLES WERE COLLECTED DURING THE ROUND ONE EVENT (1986). GROUNDWATER, SURFACE WATER, AND SEDIMENT SAMPLES WERE RE-COLLECTED DURING THE ROUND TWO EVENT (1987).

**Baker**  
Baker Environmental, Inc.

FIGURE 4-11A  
LOCATION OF CONFIRMATION STUDY  
SAMPLES - SITE 11  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



# NOTES

- 1.) THIS FIGURE WAS REPRODUCED FROM FIGURE 4-3 FROM THE SITE INVESTIGATION (SI) REPORT (WESTON, 1994).
- 2.) THE SITE INVESTIGATION WAS CONDUCTED BY WESTON IN 1992.
- 3.) THIS FIGURE SHOWS MONITORING WELL LOCATIONS, GROUNDWATER SAMPLE LOCATIONS, AND SURFACE WATER/SEDIMENT SAMPLE LOCATIONS. SURFACE SOIL AND SOIL GAS SAMPLE LOCATIONS ARE NOT SHOWN.
- 4.) MONITORING WELLS 11GW01, 11GW02, AND 11GW03 WERE INSTALLED UNDER THE CONFIRMATION STUDY (1986). MONITORING WELLS 11GW04 AND 11GW05 WERE INSTALLED UNDER THE SI.

## LEGEND

- Monitoring Well Location
- Marsh Sediment Sample Location
- Surface Water and Sediment Sample Location
- Stream

100 0 100 200  
Scale in Feet

200 0 100 200  
1 inch = 200 ft.

**Baker**

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FIGURE 4-11B  
LOCATION OF SITE INVESTIGATION  
SAMPLES - SITE 11  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

4-43

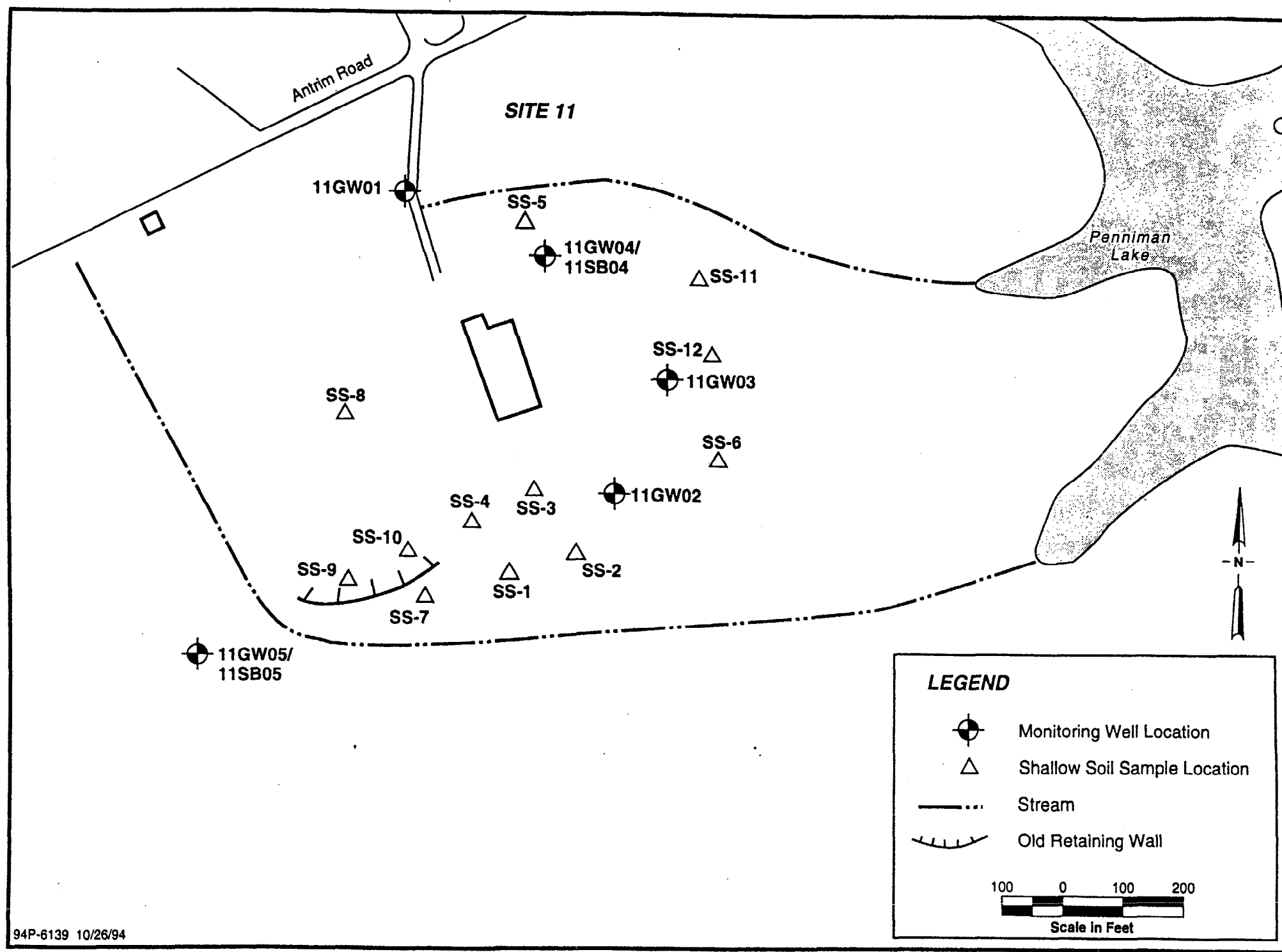


FIGURE 4-6 SURFACE SOIL SAMPLE LOCATIONS - SITE 11

**WESTON.**  
ENGINEERS CONSULTANTS

**Baker**  
Baker Environmental, Inc.

**NOTES**

- 1.) THIS FIGURE WAS REPRODUCED FROM FIGURE 4-6 FROM THE SITE INVESTIGATION (SI) REPORT (WESTON, 1994).
- 2.) THE SITE INVESTIGATION WAS CONDUCTED BY WESTON IN 1992.

200 0 100 200  
1 inch = 200 ft.

FIGURE 4-11C  
LOCATION OF SITE INVESTIGATION SURFACE  
SOIL SAMPLES - SITE 11  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



4-41

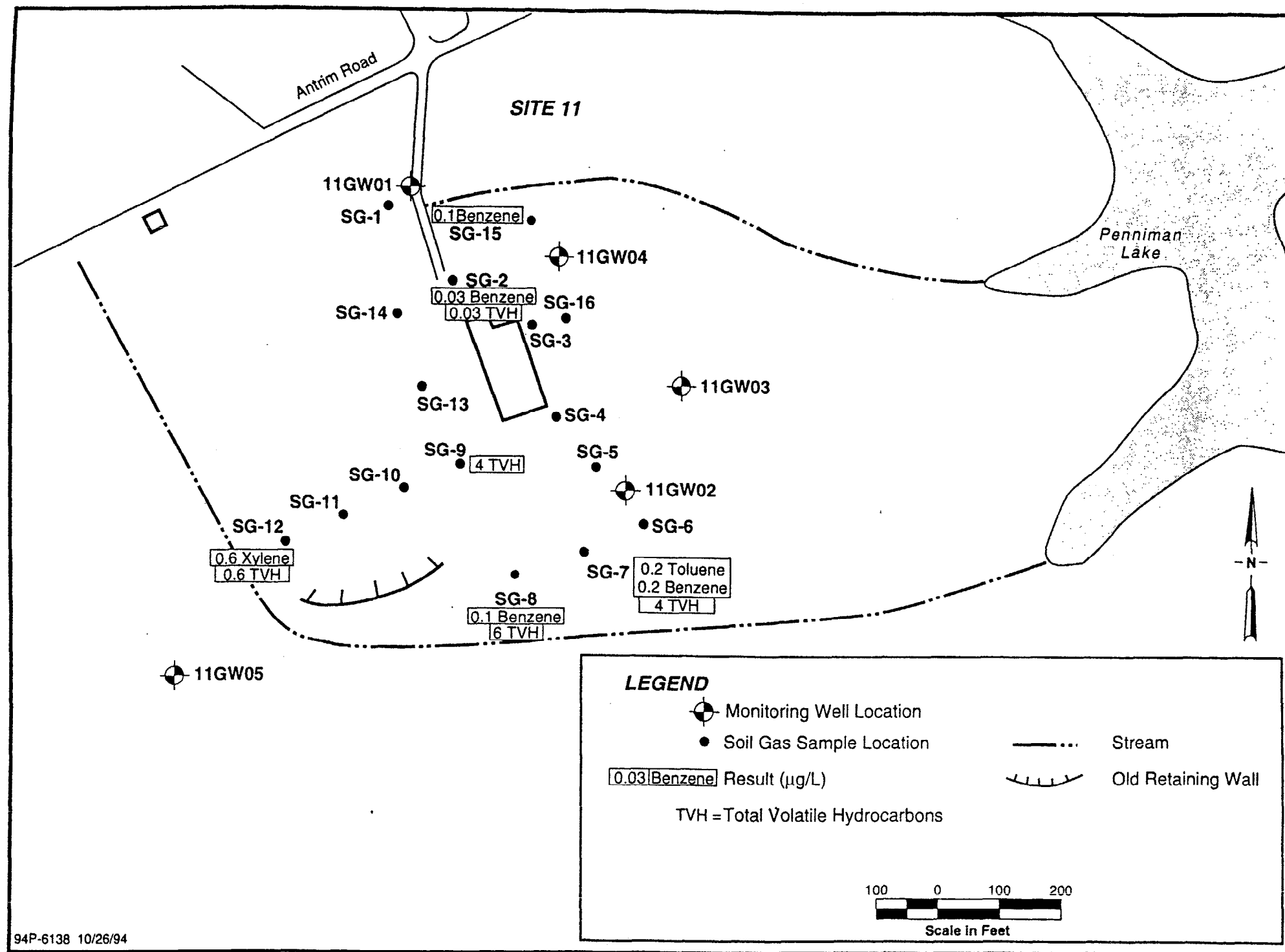


FIGURE 4-5 SOIL GAS SAMPLE LOCATIONS AND RESULTS - SITE 11

**WESTON**  
MANAGERS  
RESOURCES CONSULTANTS

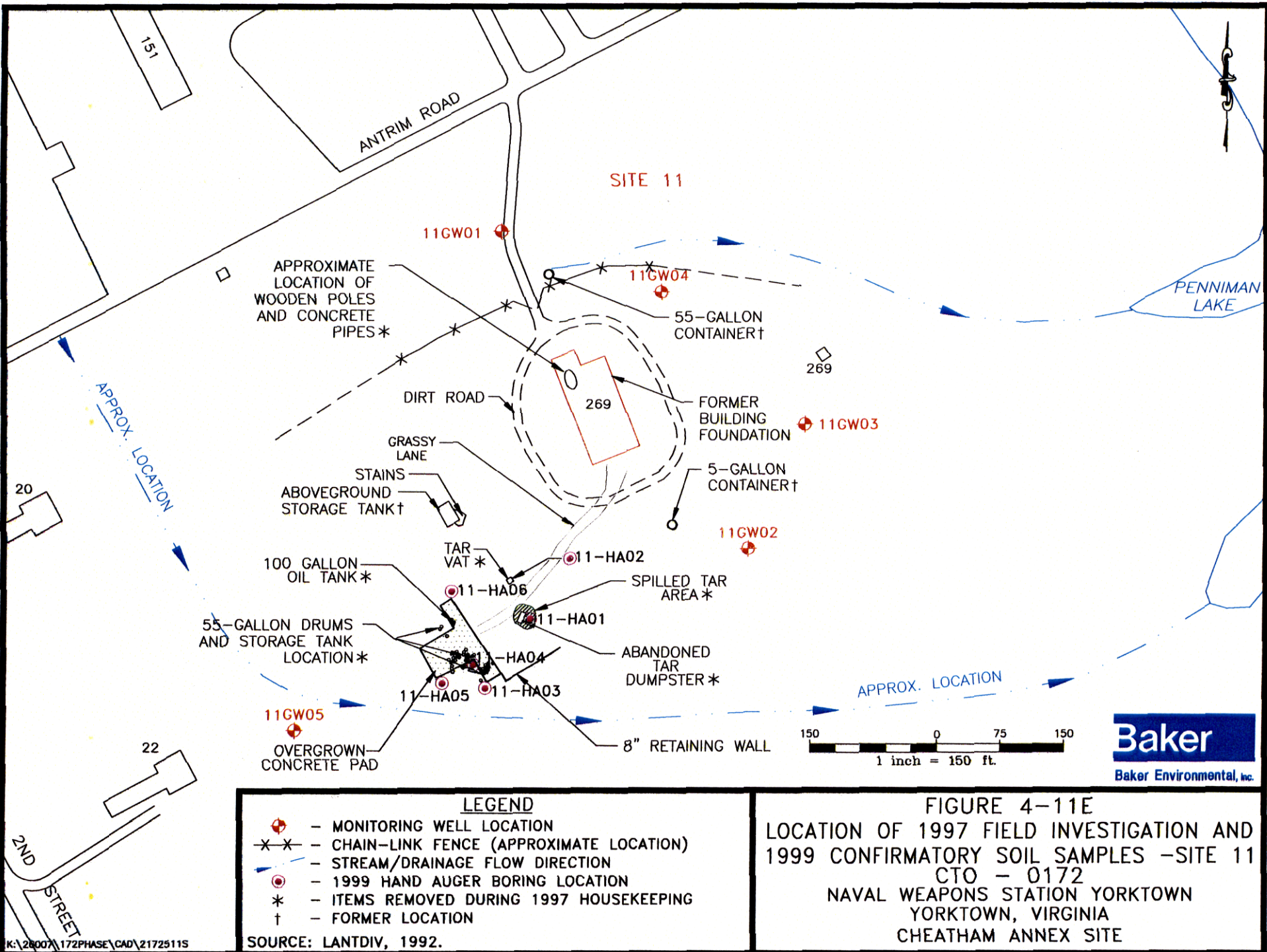
**Baker**  
Baker Environmental, Inc.

**NOTES**

- 1.) THIS FIGURE WAS REPRODUCED FROM FIGURE 4-5 FROM THE SITE INVESTIGATION (SI) REPORT (WESTON, 1994).
- 2.) THE SITE INVESTIGATION WAS CONDUCTED BY WESTON IN 1992.

FIGURE 4-11D  
LOCATION OF SITE INVESTIGATION  
SOIL-GAS SAMPLES - SITE 11  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

200 0 100 200  
1 inch = 200 ft.



### **SITE 12 – DISPOSAL SITE NEAR WATER TOWER**

Site 12 is located approximately 2000 feet west of Jones Pond as shown on Figure 4-12. The site was used for surface disposal of scrap metal; primarily old automobile parts and iron pipe. Based on visual inspection of the site approximately 10 to 110 cubic feet of material was disposed at the site. Only non-hazardous materials were disposed at the site and no signs of stressed vegetation were noted at the time of the IAS (NEESA, 1984). Because the materials disposed of at the site were reportedly not hazardous, the IAS recommended no further study.

The EPIC Study (USEPA, 1998) indicates that a small mound of dark-toned material is present at the site in 1955, but not present in 1963. It is not clear from the IAS whether the debris was present at the time of the IAS, or if it had already been removed. The debris is no longer present at the site. One possibility is that the debris was relocated to one of the nearby unnamed tributaries to Jones Pond. Large quantities of debris are present in these tributaries in the areas that AOC 1 – Scrap Metal Dump currently occupy. Debris similar to that described for Site 12 in the IAS is visible in these areas. An aerial photograph showing AOC 1 is presented on Figure 4-A1.

A summary of significant environmental actions/activities to date for Site 12 is presented on Table 4-12.

#### **Status of Site 12 – Disposal Site near Water Tower**

Based on the inert nature of the materials that were reportedly disposed of or stored at Site 12, the site is not considered to be a significant source of contamination.

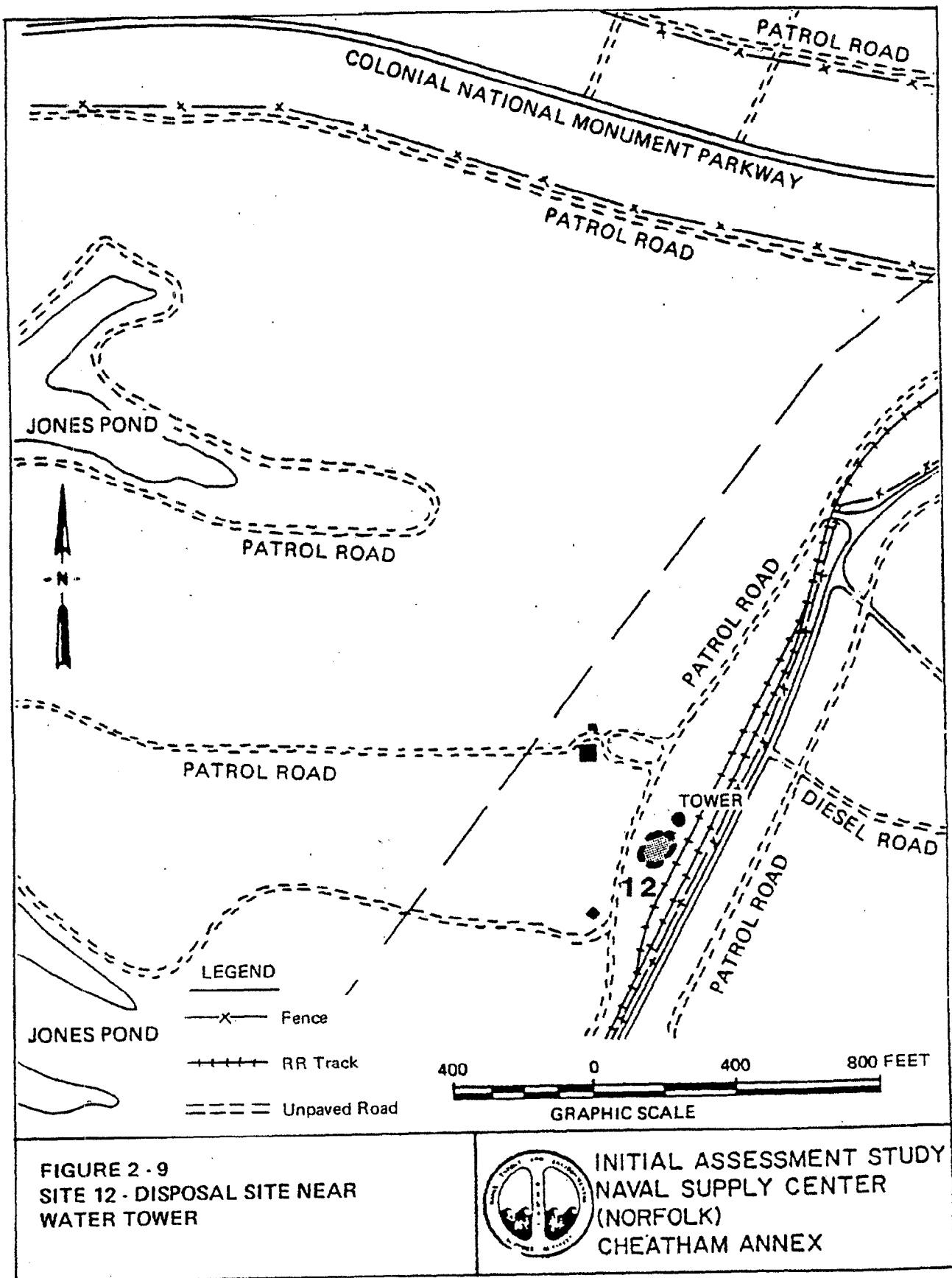
#### **Future Activities Planned for Site 12 – Disposal Site near Water Tower**

Limited sampling will be performed to assess the impact of past storage activities. The investigation has not been scheduled or funded to date.

**TABLE 4-12**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
SITE 12 – DISPOSAL SITE NEAR WATER TOWER  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>SITE 12 – DISPOSAL SITE NEAR WATER TOWER</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1955	EPIC Study notes small mound of dark-toned material	Mound not present in 1963
1984	IAS (NEESA)	Not clear if debris is present at site at time of study. Site reportedly used for surface disposal of scrap metal, primarily automobile parts and iron pipe. Recommends no further study due to the non-hazardous nature of the materials disposed at the site
Future Activities	Limited sampling.	Investigation has not been funded or scheduled.



NOTE:

1. This figure was reproduced from Figure 2-9 from the IAS Report (NEESA, 1984)

**Baker**

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FIGURE 4-12  
SITE PLAN - SITE 12  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

### **AOC 1 – SCRAP METAL DUMP**

AOC 1 is a debris disposal area located just west of Chapman Road within two ravines associated with unnamed tributaries to Jones Pond. Wood and metal debris outcrop from the banks of the ravines, with debris being more extensive within the southern ravine. There is orange staining in the unnamed tributary that receives runoff from the southern ravine. This discoloration may be a result of natural oxidation processes and is not necessarily indicative of site contamination. This location was designated as an AOC in 1998 following site visits by LANTDIV, USEPA, and VDEQ representatives.

Two cylinders are present along the top of bank along the northern ravine. The northern and southern ravines are depicted on Figures 4-A1N and 4-A1S, respectively. From information presented in the September 30, 1998, letter from Mr. Robert McGlade (Roy F. Weston), the two cylinders, which are 8 inches in diameter and 54 inches long, are severely corroded. Markings were distinguishable on both of the cylinders, and included raised lettering around the neck "THE LIQUID CARBONIC CO." The cylinders have intact valves and welded base supports.

AOC 1 is not specifically identified in the EPIC Study (USEPA, 1998). However, in 1942, the area had been cleared of trees and contained a large mound of light-toned material. The adjacent rail yard was under construction at the time. In 1955, the area was partially revegetated, and in 1963 a large mound of fill was noted. By 1975, the area appeared to be revegetated.

In November 1999 a Field Investigation that included a geophysical survey and collection of soil, surface water and sediment samples was performed. Collected samples are tabulated on Table 4-A1. Locations of samples are depicted on Figures 4-A1NA (north area) and 4-A1SA (south area). VOCs, SVOCs, pesticides, PCBs, inorganics, and cyanide were detected in the surface soil samples. SVOCs and inorganics were detected in the surface water at low levels. VOCs, SVOCs, PCBs, and inorganics were detected in the sediment samples. The extensive volume of debris at the AOC is a potential source of contamination.

The Draft Final Site Inspection Report (Baker, 2000e) recommended that a limited investigation to evaluate disposal parameters be performed. In addition, an EE/CA was recommended to evaluate the most appropriate means of removing or covering the debris that is present at the site.

A summary of significant environmental actions/activities to date for AOC 1 is presented on Table 4-A1A.

#### **Status of AOC 1 – Scrap Metal Dump**

LANTDIV recognizes that sources of contamination may be present at the site. Removal of sources of contamination are recommended based on results of the Site Inspection Report.

#### **Future Activities Planned for AOC 1 – Scrap Metal Dump**

Future planned activities for AOC 1 include:

- Finalize SI Report (March 2001)



TABLE 4-A1

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**AOC 1 – SCRAP METAL DUMP**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

Sample ID	Media	Analytical Parameters
<b>NOVEMBER 1999 FIELD INVESTIGATION</b>		
A1-HA01-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA02-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA03-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA04-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA05-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA06-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA02-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA03-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA04-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA05-01	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-HA06-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD01-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD02-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD03-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD04-00	Surface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD01-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD02-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD03-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SD04-01	Subsurface Sediment	TCL organics, nitramines, TAL inorganics and cyanide
A1-SW01	Surface Water	TCL organics, nitramines, TAL inorganics and cyanide
A1-SW02	Surface Water	TCL organics, nitramines, TAL inorganics and cyanide
A1-SW03	Surface Water	TCL organics, nitramines, TAL inorganics and cyanide

## Notes:

TCL = Target Compound List

TAL = Target Analyte List

(QA/QC) Samples are not listed.

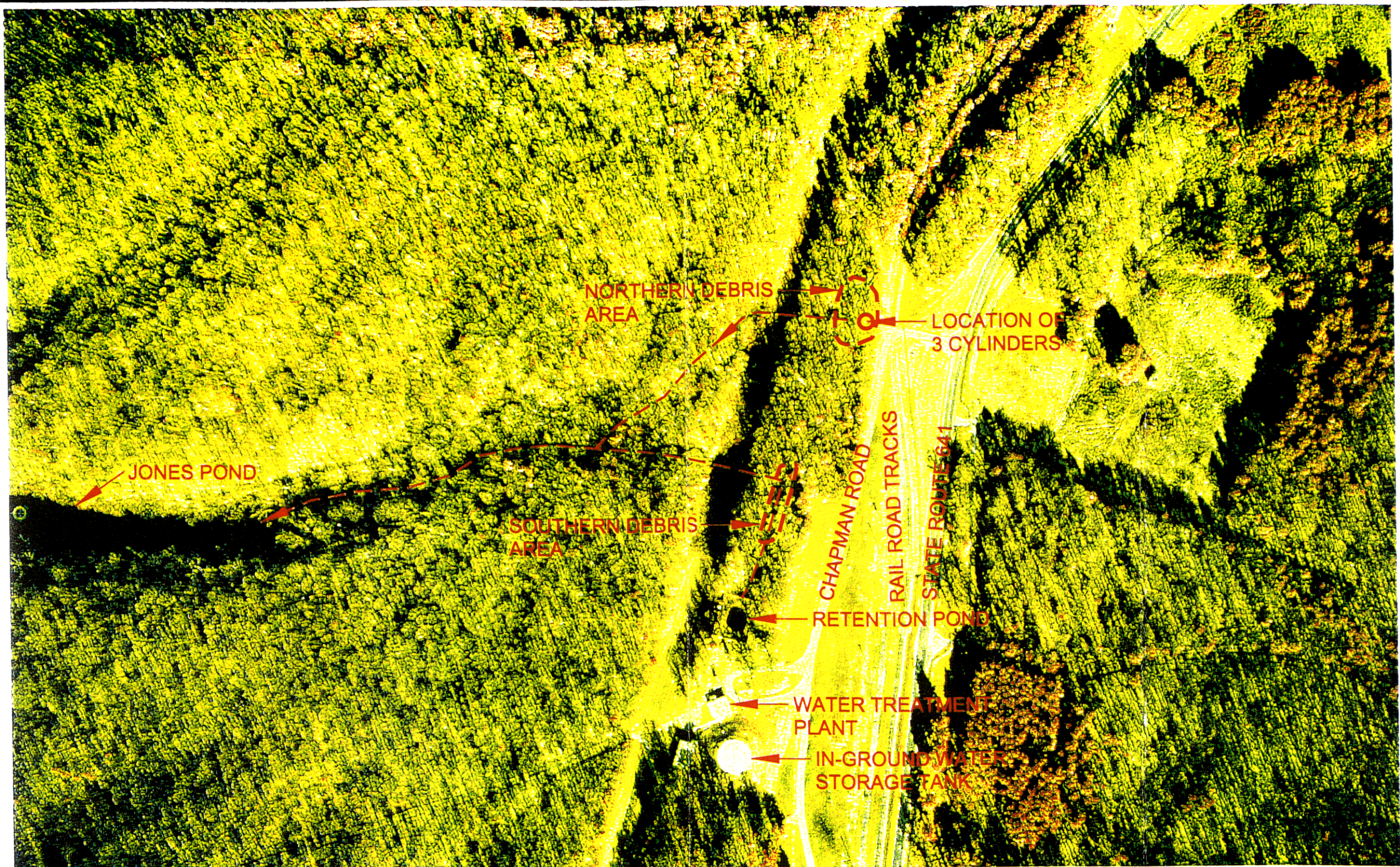
Quality Assurance/Quality Control

**TABLE 4-A1A**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
AOC 1 – SCRAP METAL DUMP  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**


<b>AOC 1 – SCRAP METAL DUMP</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1942	EPIC Study notes area cleared of trees and contained a large mound of light-toned material. Adjacent railroad was under construction.	Not identified as a site or AOC in EPIC Study.
1955, 1963, 1975	EPIC Study notes that area is partially revegetated in 1955, and in 1963 a large mound of fill is noted. Area is revegetated by 1975.	Not identified as a site or AOC in EPIC Study.
November 1999	Field Investigation	Collected soil, surface water and sediment samples.
September 2000	Draft Final Site Inspection Report, Site 4 and AOC 1	Recommends an EE/CA to evaluate most appropriate means of removing or covering debris.
Future Activities	Finalize SI Report.	SI Report will be finalized in March 2001. No further activities currently planned.

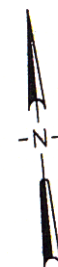





Baker

2104507M


**LEGEND**  
 UNNAMED TRIBUTARY  
 WITH FLOW DIRECTION



APPROXIMATE SCALE  
  
 0 3000 6000

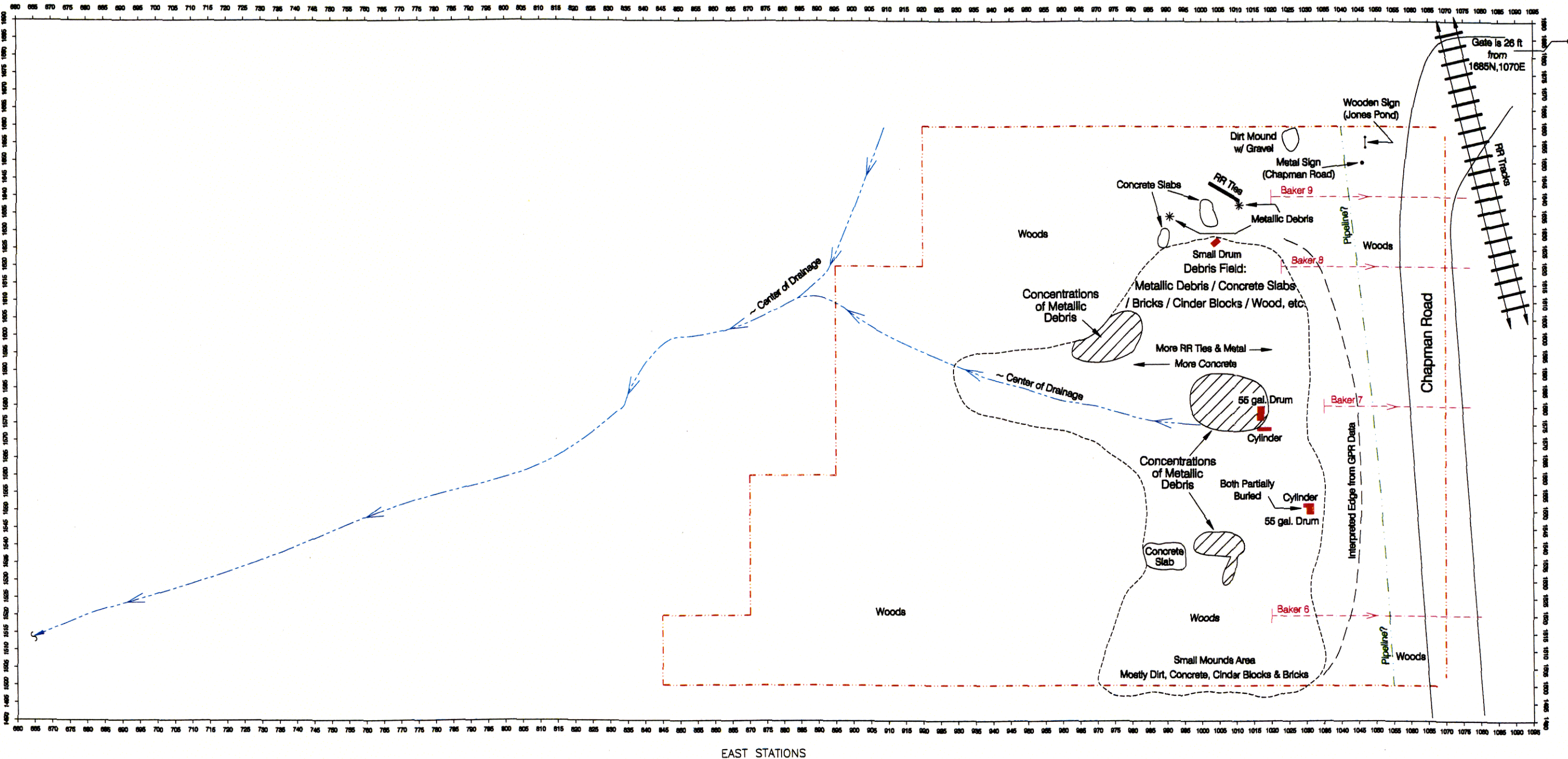
SOURCE: AERIAL PHOTOGRAPHIC ANALYSIS USEPA 1998.

FIGURE 4-A1  
 SITE AERIAL PHOTOGRAPH – AOC 1  
 JANUARY 1, 1998

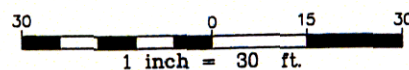
NAVAL WEAPONS STATION YORKTOWN  
 YORKTOWN, VIRGINIA  
 CHEATHAM ANNEX SITE



NORTH STATIONS



EAST STATIONS



**Baker**  
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# LEGEND

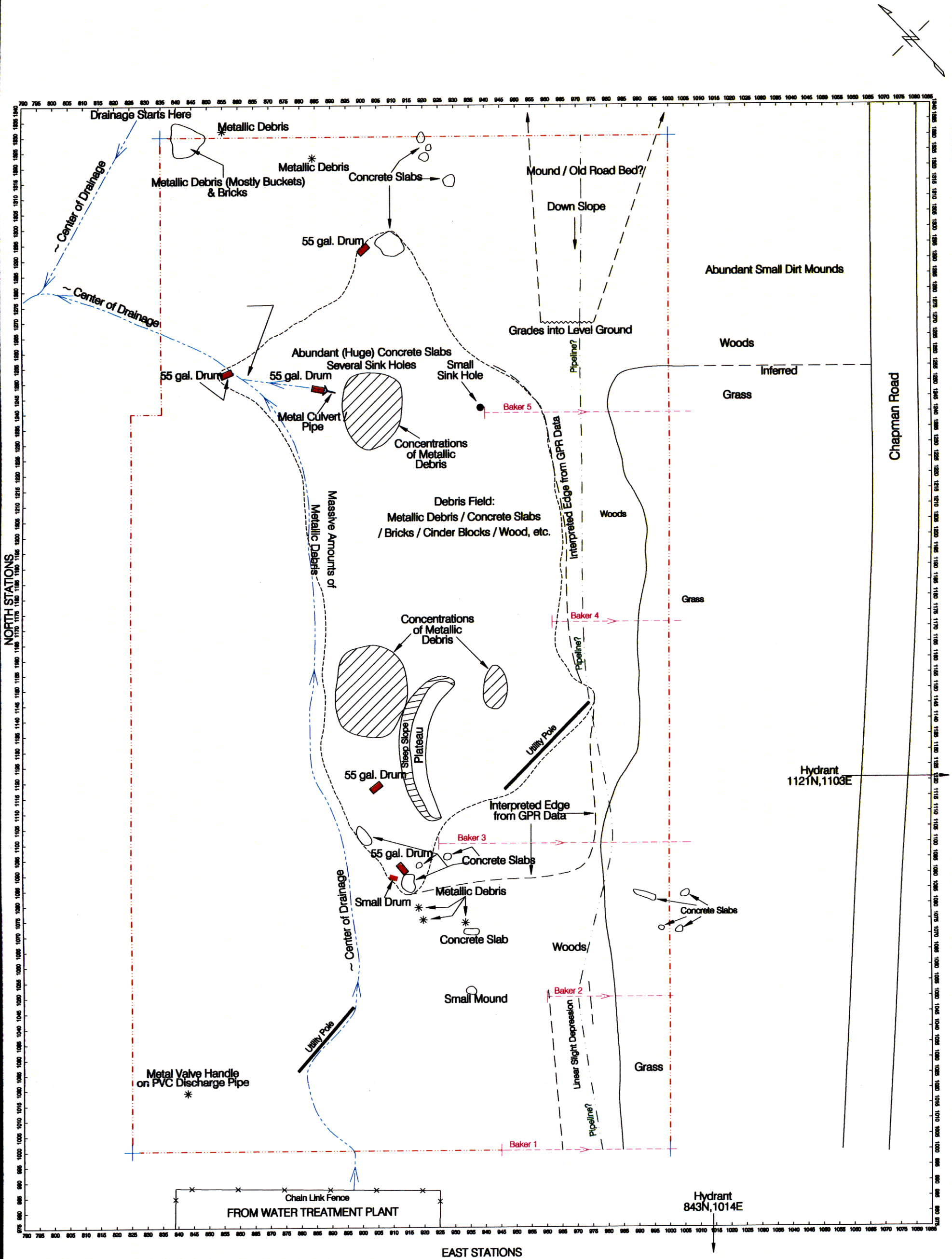
- AREA OF GEOPHYSICAL INVESTIGATION
- Baker 6 — GPR PROFILE

FIGURE 4-A1N  
SITE PLAN - AOC 1 (NORTH AREA)  
CTO - 0172

NAVAL WEAPONS STATION YORTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

SOURCE: NAEVA GEOPHYSICS, INC., 11/99





**LEGEND**

- AREA OF GEOPHYSICAL INVESTIGATION
- Baker 1 - GPR PROFILE

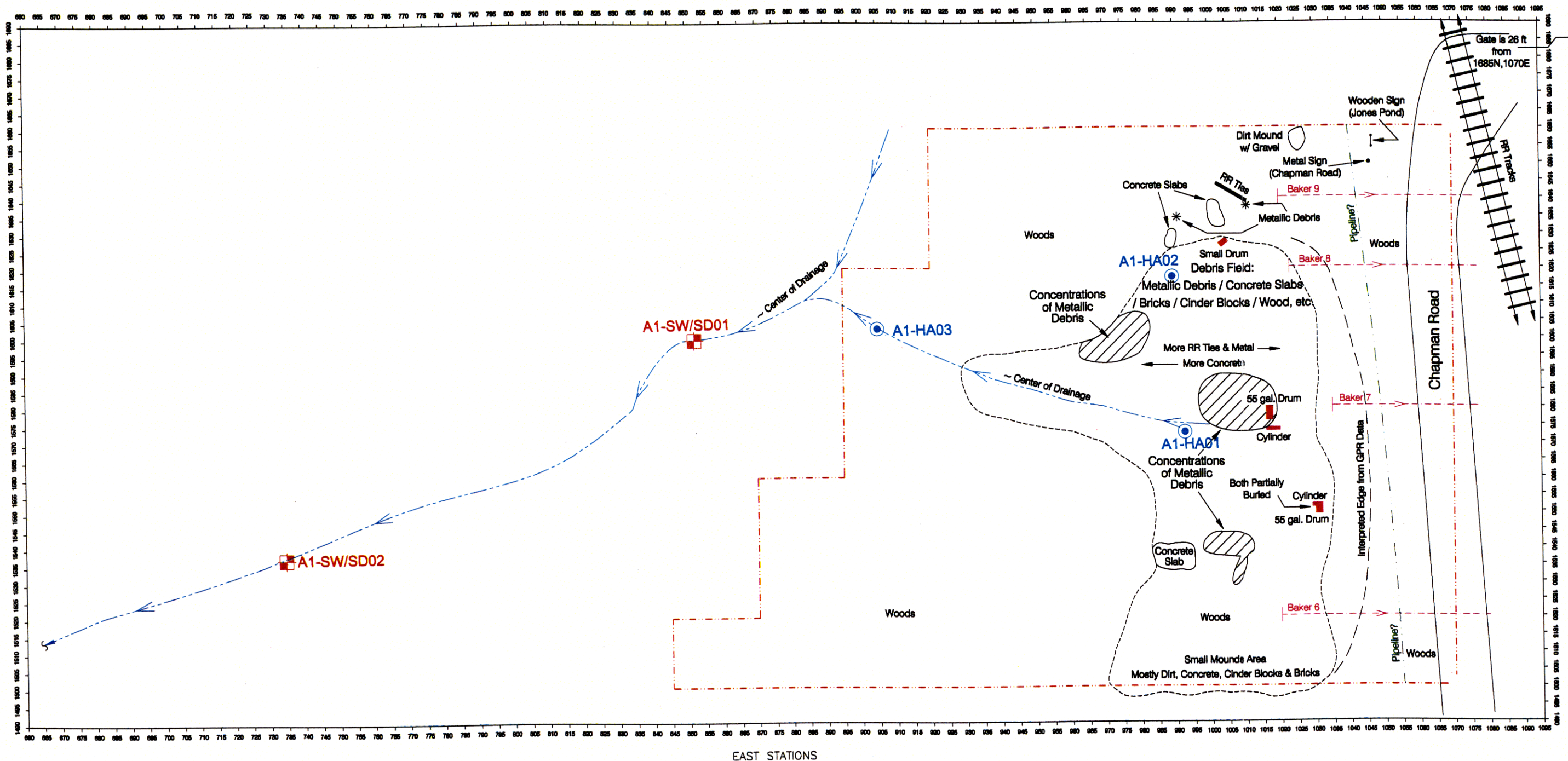
SOURCE: NAEVA GEOPHYSICS, INC. 11/99

**FIGURE 4-A1S**  
**SITE PLAN -AOC 1 (SOUTH AREA)**  
**CTO-0172**

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN VIRGINIA  
CHEATHAM ANNEX SITE



NORTH STATIONS



NOTE: NO SUBSURFACE  
SOIL SAMPLE  
COLLECTED AT A1-HA01  
DUE TO OBSTRUCTION

30 0 15 30  
1 inch = 30 ft.

**Baker**  
Baker Environmental, Inc.

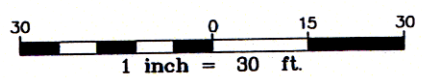
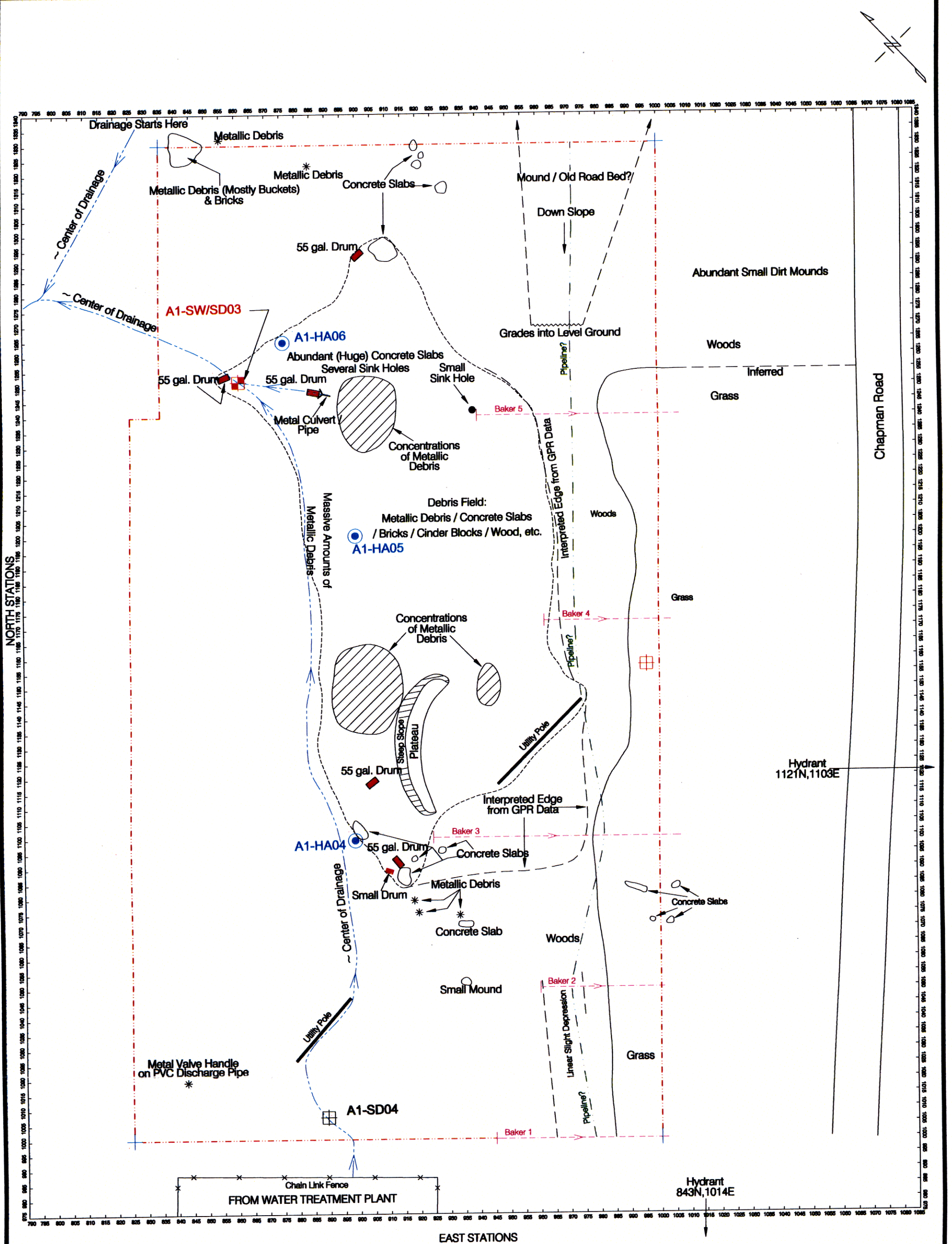
- LEGEND**
- AREA OF GEOPHYSICAL INVESTIGATION
  - Baker 6 - GPR PROFILE
  - - HAND AUGER BORING LOCATION
  - - SURFACE WATER/ SEDIMENT SAMPLE LOCATION

**FIGURE 4-A1NA**  
**LOCATIONS OF PREVIOUSLY**  
**COLLECTED SAMPLES - AOC 1 (NORTH AREA)**  
**CTO - 0172**

NAVAL WEAPONS STATION YORTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

SOURCE: NAFVA GEOPHYSICS, INC., 11/99





**Baker**  
Baker Environmental, Inc.

LEGEND	
	- AREA OF GEOPHYSICAL INVESTIGATION
	- GPR PROFILE
	- HAND AUGER BORING LOCATION
	- SEDIMENT SAMPLE LOCATION
	- SURFACE WATER/ SEDIMENT SAMPLE LOCATION

**FIGURE 4-A1SA**  
**LOCATION OF PREVIOUSLY COLLECTED SAMPLES -AOC 1 (SOUTH AREA)**  
**CTO-0172**

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN VIRGINIA  
CHEATHAM ANNEX SITE

## AOC 2 – DEXTROSE DUMP

AOC 2 was discovered during site visits performed by LANTDIV, USEPA, VDEQ, and Baker in late 1997 and early 1998. The area is situated in woods, north of Garrison Road, along the southern perimeter of CAX as shown on Figure 4-A2. The area contains several rows of concrete foundation piers which at one time apparently supported a Shipping House associated with the former Penniman Shell Loading Plant. The majority of the structures associated with the Penniman facility were demolished somewhere between 1918 and 1925. There is no evidence of the structure other than the foundation piers. However, grass-covered lanes which lead to the area are likely locations of former rail lines that have been removed. Several glass bottles (many of which are labeled dextrose) were present, both upon the ground surface and partially buried. In addition, several partially buried drums (apparently empty) were also noted. Mounds of soil which are present may also be indicative of buried materials. One buried drum (which can be seen through a void in the ground) is present to the east of the abandoned foundation. It is suspected that additional buried drums may be located in this area.

During May 1998, Reactives Management, Inc. removed a total of 470 bottles from the site as part of a routine housekeeping operation. Approximately 5 percent of the bottles (24 bottles) were selected randomly and analyzed. Each bottle contained greater than 2,000 ppm glucose indicating that the bottles did contain dextrose, as suspected. The contents of the bottles were emptied into the Hampton Roads Sanitation District (HRSD) sanitary sewer system. The bottles were rinsed, allowed to dry, and transported to a local glass recycling facility. This operation was limited to bottles present at the surface. Partially buried bottles are still present at the surface (Reactivities Management, 1998).

In 1998, Baker performed a Field Investigation for AOC 2 that consisted of a geophysical survey, and soil and groundwater investigations (including installation of temporary monitoring wells). Sample locations are depicted on Figure 4-A2A. VOCs, pesticides and inorganics were detected in the soil samples at low levels. SVOCs and inorganics were detected in groundwater samples at low levels. The presence of these constituents was not suspected to be related to site activities. The inorganics detected were typically present within the range, or just above the range of background levels established for WPNSTA Yorktown.

The Field Investigation Report (Baker, 1999b) recommended that the sources of the geophysical anomalies and potential sources of contamination be identified by excavating a total of six shallow test pits in the vicinity of the most significant anomalies detected.

In November 1999 Baker performed a Field Investigation that included test pits and exploratory hand auger borings to define the lateral extent of buried debris at the site. Samples of native soil and soil within the debris zones were collected. During the investigation, a large volume of buried drums and respirator filter canisters were encountered. A few of the drums contained a thin layer of tar coating or residue. The remaining drums were empty. One sample of tar was collected and submitted for laboratory analysis of chemical warfare materials (CWM) and degradation products. No CWM-related constituents were detected and the sample was determined to consist of a heavy hydrocarbon material (i.e., tar). One of the respirator cartridges was submitted for Toxicity Characteristic Leachate Procedure (TCLP) analysis and determined to be hazardous due to elevated cadmium and lead.

In the Draft Final Field Investigation Report (Baker, 2000f), additional geophysical surveying with confirmatory test pitting was recommended to further delineate the extent of buried debris, with

emphasis placed on locating areas of buried respirator cartridge canisters. Based on the findings of the investigation, it was recommended that an EE/CA be completed to determine the appropriate management strategy for the site.

A summary of the samples collected to date at AOC 2 is presented on Table 4-A2. A summary of significant environmental actions/activities to date for AOC 2 is presented on Table 4-A2A.

#### **Status of AOC 2 – Dextrose Dump**

A large volume of buried debris has been located at the site. It will be necessary to remove the respirator cartridges and to address the other buried debris at the site.

#### **Future Activities Planned for AOC 2 – Dextrose Dump**

Future planned activities for AOC 2 include:

- Finalize Field Investigation Report (March 2001)
- Spring 2001 Field Investigation – extensive trenching is proposed to further delineate extent of buried debris (June 2001)
- Finalize EE/CA to address buried canisters (July 2001)
- Finalize Action Memorandum to address buried canisters (July 2001)
- Removal Action to address buried canisters (not scheduled or funded).
- Remedial Action (if warranted based on results of the 2001 Field Investigation), not scheduled or funded.

TABLE 4-A2

**SUMMARY OF SAMPLES COLLECTED DURING PREVIOUS INVESTIGATIONS**  
**AOC 2 – DEXTROSE DUMP**  
**INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN**  
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**  
**CHEATHAM ANNEX SITE**

SAMPLE ID	MEDIA	ANALYTICAL PARAMETERS
<b>1998 FIELD INVESTIGATION</b>		
A2-HA01-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-HA02-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB01-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB02-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB03-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB04-00	Surface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-HA01-02	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-HA02-01	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB01-03	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB01-15	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2DPB02-03	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB02-10	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB03-03	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB03-09	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB04-03	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPB04-09	Subsurface Soil	TCL organics, nitramines, TAL inorganics and cyanide
A2-DPW01	Groundwater	TCL organics, nitramines, TAL inorganics (filtered and unfiltered), and cyanide
A2-DPW02	Groundwater	TCL organics, nitramines, TAL inorganics (filtered and unfiltered), and cyanide
A2-DPW03	Groundwater	TCL organics, nitramines, TAL inorganics (filtered and unfiltered), and cyanide
A2-DPW04	Groundwater	TCL organics, nitramines, TAL inorganics (filtered and unfiltered), and cyanide
<b>1999 FIELD INVESTIGATION</b>		
A2-TP01-N through A2-TP06-N	Native soil underlying debris in test pit.	TCL organics, TAL inorganics and cyanide
A2-TP01-F through A2-TP06-F	Soil within debris zone in test pit.	TCL organics, TAL inorganics and cyanide
A2-TPCOMP-01	Composite of soil within debris zone in test pits.	TCLP parameters, RCRA characteristics
A2-CART-01	Respirator canister	TCLP parameters, RCRA characteristics
A2-TAR-01	Tar residue from drum.	Chemical warfare compounds and degradants.
A2-CS01 through A2-CS04	Soil underlying or within drum/respirator zone.	TCL organics, TAL inorganics and cyanide

Notes:

Quality Assurance/Quality Control (QA/QC) samples not listed.

TAL – Target Analyte List

TCL – Target Compound List

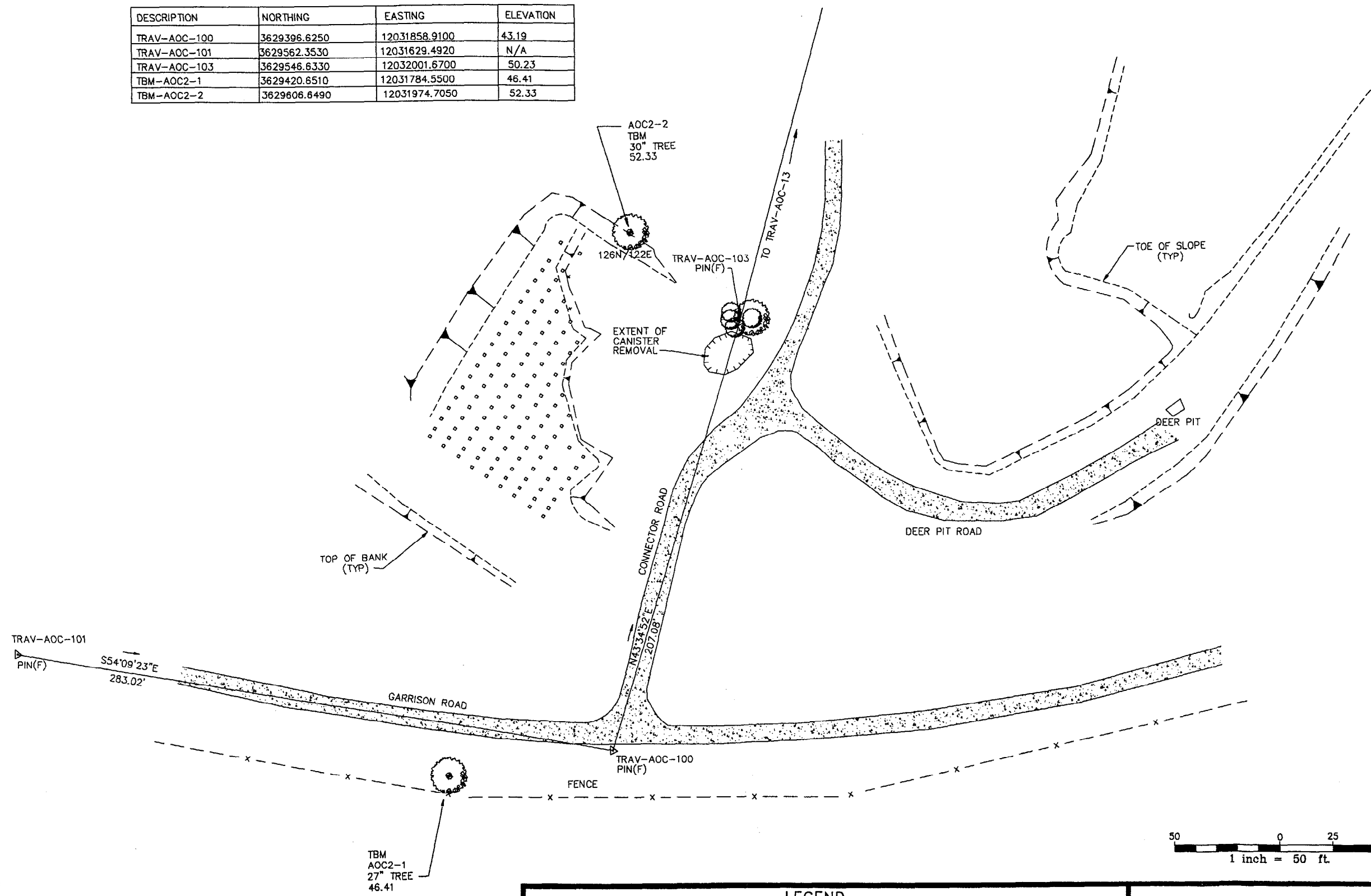
TABLE 4-A2A

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
AOC 2 – DEXTROSE DUMP  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>AOC 2 – DEXTROSE DUMP</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1915 to 1918	Approximate date of construction of Penniman Facility Shipping House.	Shipping House demolished between 1918 and 1925.
1970s	Estimated timeframe of disposal of dextrose bottles.	Drums may have been disposed of previously. Disposal dates not well documented
Late 1997	Site discovered during site reconnaissance	Identified as AOC 2
May 1998	Housekeeping by Reactives Management, Inc.	Dextrose bottles removed from surface. No intrusive activities
1998	Field Investigation (Baker)	Geophysical anomalies located
November 1999	Field Investigation	Located buried drums and test pit canisters. Collected soil samples. Field Investigation Report (1999 investigation) will be finalized in March 2001.
October 2000	Draft Final Field Investigation Report, Site 7 and AOC 2	Recommends an EE/CA be completed to determine the appropriate management strategy for removal of buried canisters.
Future Activities	Spring 2001 Field Investigation	Extensive trenching proposed to further delineate extent of buried debris. Removal Action and associated EE/CA (finalize July 2001) and Action Memorandum (finalize October 2001). Implement Remedial Action if warranted (not scheduled or funded).



TRAVERSE AND CONTROL POINTS			
DESCRIPTION	NORTHING	EASTING	ELEVATION
TRAV-AOC-100	3629396.6250	12031858.9100	43.19
TRAV-AOC-101	3629562.3530	12031629.4920	N/A
TRAV-AOC-103	3629546.6330	12032001.6700	50.23
TBM-AOC2-1	3629420.6510	12031784.5500	46.41
TBM-AOC2-2	3629606.6490	12031974.7050	52.33



NOTE: COORDINATES ARE BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD83, US SURVEY FOOT. ELEVATIONS SHOWN ARE BASED ON NAVD 88.  
SOURCE: PATTON, HARRIS, RUST AND ASSOCIATES, MARCH 2000.

**LEGEND**

--- TOP OF BANK

- - - TOE OF SLOPE

○ TREE

▲ SLOPE INDICATOR

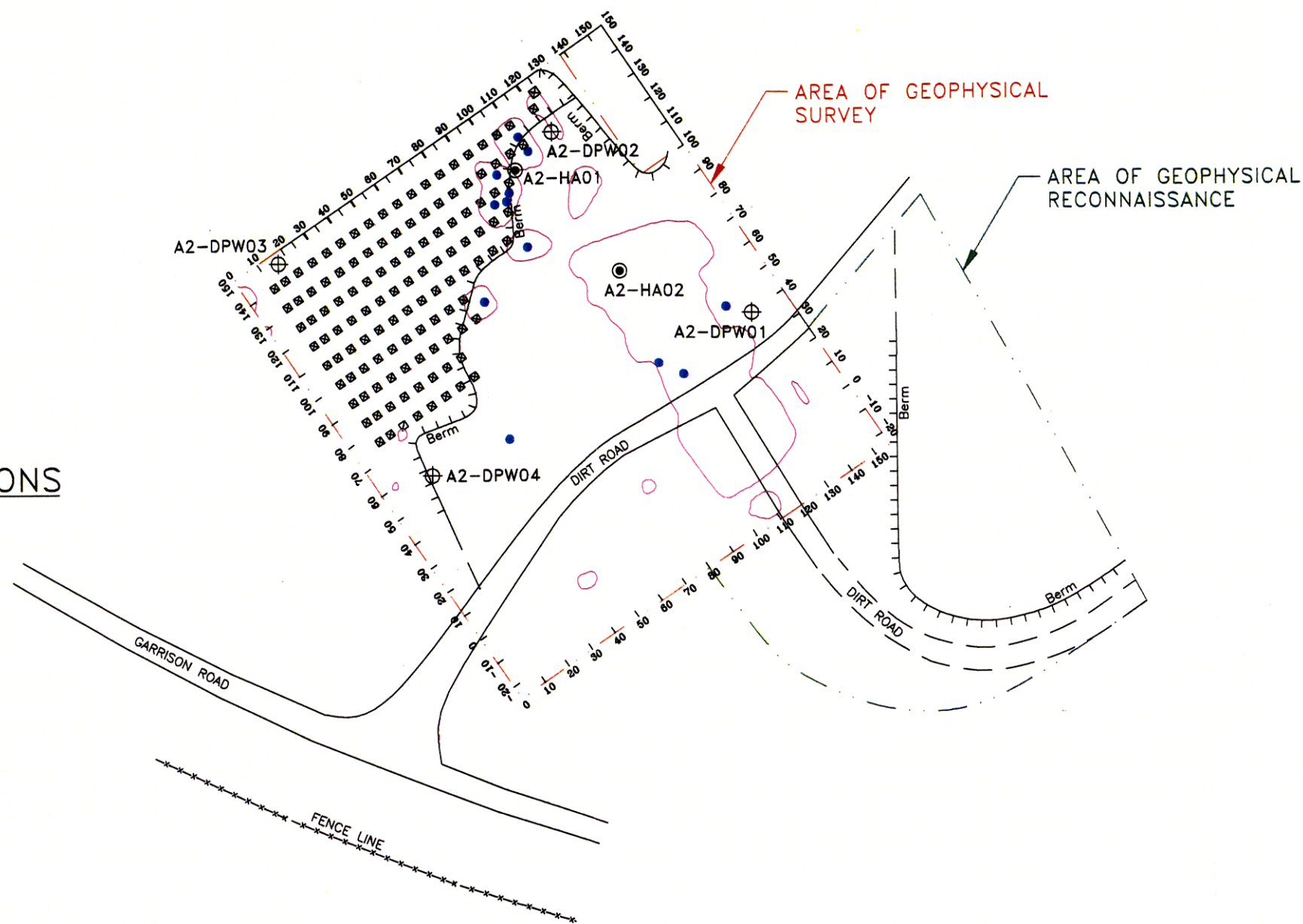
□ CONCRETE PIERS

▨ GRAVEL ROAD

△ TRAV-AOC-101 TRAVERSE POINT

FIGURE 4-A2  
SITE PLAN - AOC 2  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

DOES NOT  
SHOW 1999  
SAMPLE LOCATIONS

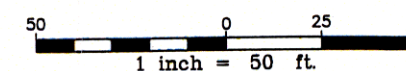


**NOTES:**

- 1.) LOCATIONS FOR FENCE LINE, GARRISON ROAD, DIRT ACCESS ROAD LEADING TO SITE, AND TEMPORARY MONITORING WELLS SURVEYED BY PATTON, HARRIS, RUST AND ASSOCIATES. OCTOBER 1998.
- 2.) LOCATIONS FOR SURFACE/SALLOW SUBSURFACE SOIL SAMPLE LOCATIONS SURVEYED BY BAKER VIA GPS. OCTOBER 1998.
- 3.) REMAINING FEATURES FIELD MAPPED BY NAEVA GEOPHYSICS, INC. OCTOBER 1998.
- 4.) ALL SAMPLES COLLECTED UNDER THE 1998 FIELD INVESTIGATION.

LEGEND	
● - EXPOSED 55 GALLON DRUM (REMOVED IN 1999)	⊕ - TEMPORARY WELL
■ - CONCRETE PIER	⊙ - SURFACE SOIL AND SHALLOW SUBSURFACE SOIL SAMPLE LOCATION
○ - AREAS OF SIGNIFICANT EM-61 ANOMALIES	

SOURCE: PHR & A, 1998.



**Baker**  
Baker Environmental, Inc.

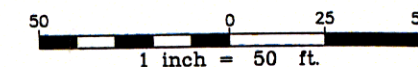
FIGURE 4-A2A  
LOCATIONS OF PREVIOUSLY COLLECTED  
SAMPLES - AOC 2  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE



TEST PIT ELEVATIONS	
X1	46.1
X2	48.2
X3	50.1
X4	NS
X5	49.3
X6	50.6
X7	47.4
X8	48.3
X9	46.7
X10	48.0
X11	44.2
X12	42.4
X13	49.0
X14	46.5
X15	48.1
X16	47.3
X17	51.8
X18	44.6
X19	50.2
X20	39.5
X21	45.9
X22	39.5
X23	40.9
X24	43.9
X25	49.1
X26	52.2
X27	NS
X28	NS
X29	50.7
X30	51.5
X31	46.3
X32	48.2
X33	49.8
X34	50.4
X35	50.0
X36	50.2
X37	49.9
X38	49.6
X39	50.0
X40	50.3
X41	49.6
X42	49.7
X43	49.0
X44	50.1
X45	48.4
X46	NS
X47	NS
TP01	NS
TP02	NS
TP03	43.0
TP04	46.5
TP05	42.8
TP06	37.8

NS - NOT SURVEYED



**Baker**  
Baker Environmental, Inc.

NOTE: COORDINATES ARE BASED ON THE VIRGINIA STATE PLANE  
COORDINATE SYSTEM, SOUTH ZONE, NAD83, US SURVEY FOOT.  
ELEVATIONS SHOWN ARE BASED ON NAVD 88.

SOURCE: PATTON, HARRIS, RUST AND ASSOCIATES, MARCH 2000.

#### LEGEND

--- TOP OF BANK  
--- TOE OF SLOPE  
▲ SLOPE INDICATOR

○ CONCRETE PIERS  
● TREE  
▨ GRAVEL ROAD

TP01  
FIELD INVESTIGATION  
TEST PIT  
(NOVEMBER 1999)  
○ EXPLORATORY TEST PIT  
(JAN./FEB. 2000)  
○ EXPLORATORY TEST HOLE  
(JANUARY 2000)  
○ EXPOSURE OBSERVATION  
POINT (JANUARY 2000)

FIGURE 4-A2B  
1999 TEST PIT  
SAMPLE LOCATION PLAN - AOC 2  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

### **AOC 3 – CAD 11/12 POND BANK**

AOC 3 consists of an approximately 20 foot by 20 foot by 10 foot high pile of metal banding along the north bank of the unnamed pond, north of D Street. The pond is situated between Buildings 11 and 12. This area, which also contains a few empty drums is adjacent to Site 4 – Medical Supplies Disposal Area as shown on Figure 4-A3. This location was designated as an AOC in 1998 following site visits by LANTDIV, USEPA, and VDEQ representatives.

During the 1999 Field Investigation two soil samples and two sediment samples were collected immediately adjacent to the metal banding pile. Results for the samples (which were collected as part of the Site 4 investigation) were included in the Site Inspection Report – Site 4 and AOC 1 (Baker, 2000e).

A summary of significant environmental actions/activities to date for AOC 3 is presented on Table 4-A3.

#### **Status of AOC 3 – CAD 11/12 Pond Bank**

The site is not currently considered to be a significant source of contamination.

#### **Future Activities Planned for AOC 3 - CAD 11/12 Pond Bank**

This area will be managed separately from Site 4. The samples collected during the 1999 Field Investigation were intended to determine if future investigation is warranted and to confirm that there are no sources of contamination present within the pile so the pile can be removed as part of a housekeeping measure, rather than under a removal action.

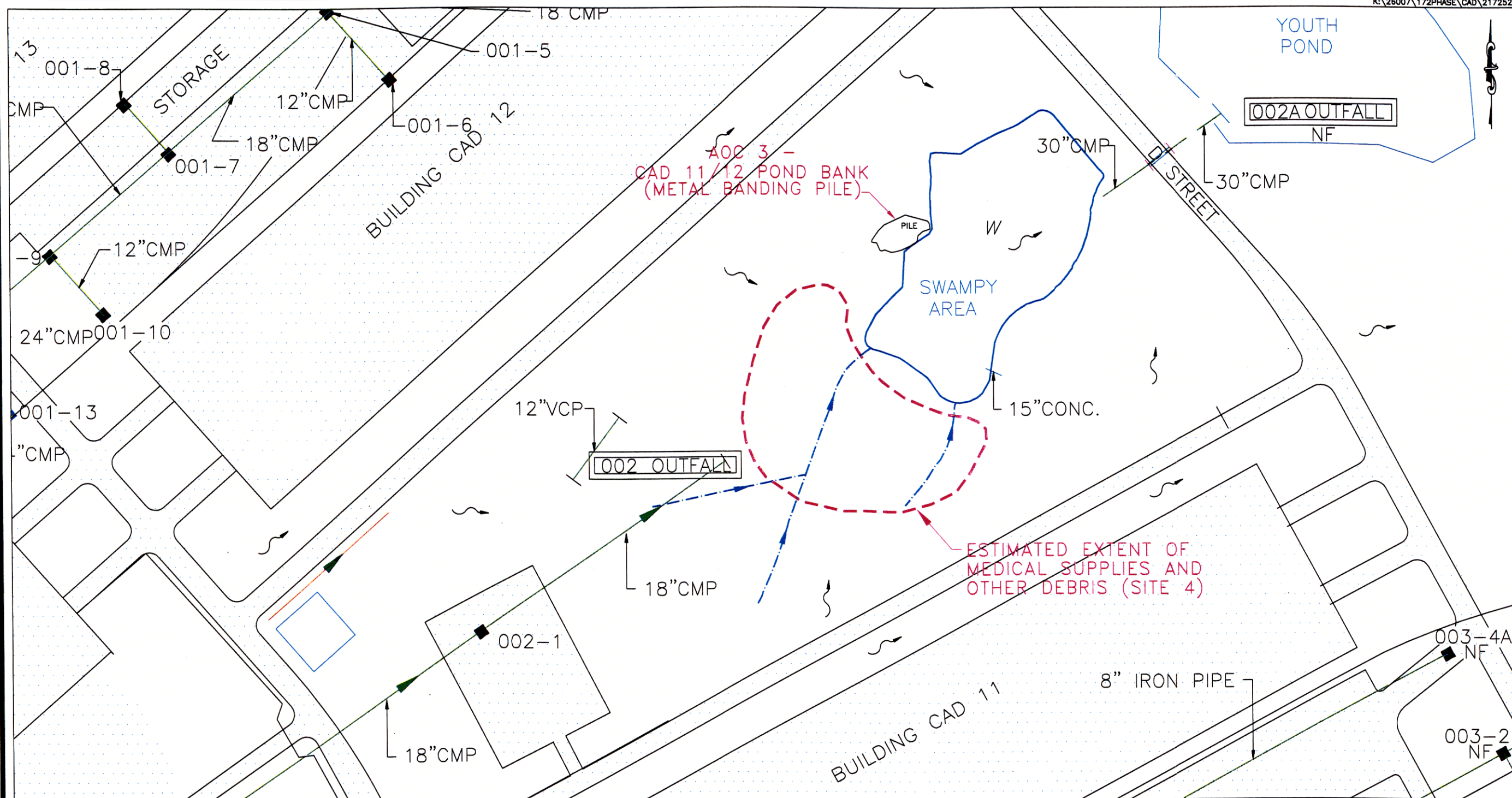
Removal of the metal banding pile or other actions at the site are not currently scheduled or funded.

**TABLE 4-A3**

**SUMMARY OF SIGNIFICANT ENVIRONMENTAL ACTIVITIES TO DATE  
AOC 3 – CAD 11/12 POND BANK  
INSTALLATION RESTORATION PROGRAM SITE MANAGEMENT PLAN  
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE**

<b>AOC 3 – CAD 11/12 POND BANK</b>		
<b>DATE</b>	<b>EVENT</b>	<b>COMMENTS</b>
1968 or 1969	Metal banding unloaded at site.	Medical supplies (Site 4) also disposed.
1984	IAS (NEESA)	Not recognized as a separate entity from Site 4. Site 4 recommended for no further study due to inert nature of materials disposed at site.
1998	Identified as a separate AOC from Site 4 by LANTDIV.	Will be managed separately from Site 4.
Future Activities	No activities specifically planned for AOC 3.	Pending discussion among WPNSTA Partnering Team, future activities may be scheduled.



**NOTES**

1) EDGE OF POND LOCATION APPROXIMATE

- LEGEND**
- - DROP INLET
  - NF - NOT FOUND
  - ~ - OVERLAND FLOW DIRECTION
  - CMP - CORRUGATED METAL PIPE
  - - DRAINAGE CHANNEL WITH FLOW DIRECTION

FIGURE 4-A3  
SITE PLAN - AOC 3  
CTO - 0172

NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

**AOC 4- IR SITE 4 - MEDICAL SUPPLIES DISPOSAL AREA**

During 1998, AOC 4 was identified as a new AOC by LANTDIV. However, based on review of site history and available information, it was determined that AOC 4 is actually the same area as Site 4. AOC 4 will no longer be addressed as separate entity.

#### **AOC 5 - DEBRIS AREA**

During 1998, AOC 5 was identified as a new AOC by LANTDIV. AOC 5 is the large pile of debris at the toe of the Site 1 landfill which contains cables, convex boxes, an empty storage tank, automobiles, airplane/boat parts, and other miscellaneous items. Based on the results of the 1998 Field Investigation (Baker, 1999b), which included a geophysical survey and soil and sediment sampling in the vicinity of the pile, it was decided by LANTDIV that it was more appropriate to manage these two areas (Site 1 and AOC 5) as one unit. This was also recommended by VDEQ. Consequently, AOC 5 will no longer be addressed as a separate unit and will be managed as part of Site 1.

### PENNIMAN AOC

A field investigation is planned in Spring 2001 that will include activities at the Penniman AOC. There are five sub-areas within this AOC:

- *Ammonia Settling Pits* – This area consists of earthen ammonia settling pits that were part of a former shell loading area located on Cheatham Annex. Waste water from an ammonia finishing building was discharged through these settling pits.
- *Trinitrotoluene (TNT) Graining House Sump* – This area consists of a concrete-lined, open top pit believed to be the sump pit for the TNT graining house in the former shell loading area.
- *TNT Catch Box Ruins* – This area consists of an earthen, brick-lined depression located immediately adjacent to the TNT graining house in the former shell loading area. This area was used to separate TNT particles from waste water.
- *Waste Slag Material* – This area consists of waste metallic slag material that is located throughout the shell loading area predominantly along the railroad tracks.
- *1918 Drum Storage* – This area was used for the storage of 55-gallon drums when the shell loading area was active.

However, based on an agreement between LANTDIV, VDEQ, and Baker after conducting a site visit in August 2000, only three of the five sub-areas will be addressed in the upcoming field investigation: Ammonia Settling Pits, TNT Graining House Sump, and TNT Catch Box Ruins (shown in Figure P-1). The TNT Graining House Sump and TNT Catch Box Ruins will be treated as one sub-area (they are adjacent to each other). During the site visit, an agreement was reached by all parties that there was insufficient evidence of site-related activity to warrant further investigation at the Waste Slag Material and 1918 Drum Storage sub-areas.

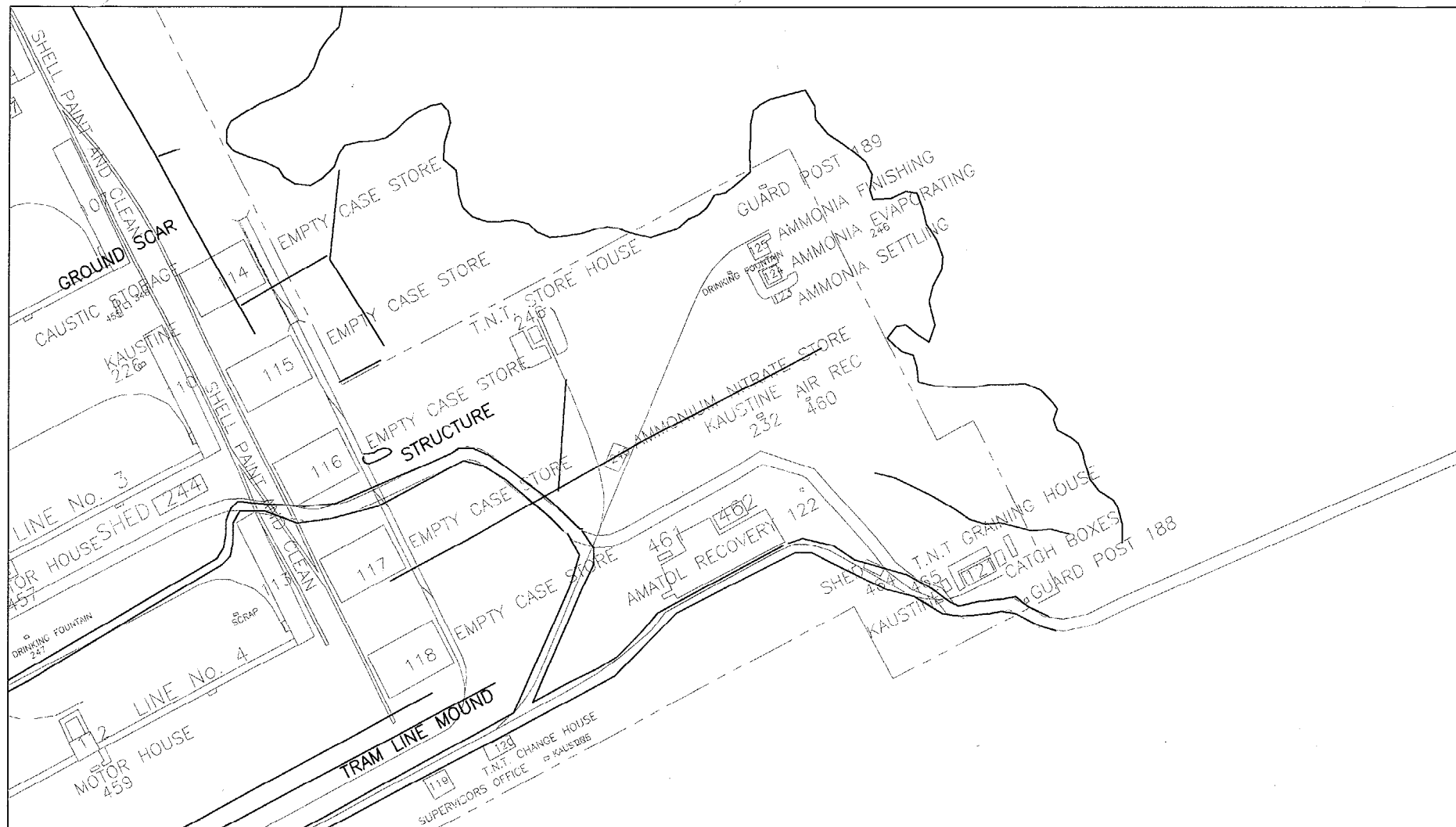
The following investigative activities are proposed at the Penniman AOC:

- Four soil samples (surface [0 to 6 inches] and subsurface [6 to 24 inches]) will be taken from two locations at the TNT Graining House Sump and TNT Catch Box Ruins. A surface and subsurface soil sample will be collected from one location at the Ammonia Settling Pits. As part of the groundwater investigation, proposed soil samples will be collected (from the 0 to 2 feet interval and the interval just above the water table) via the split-spoon sampler from each monitoring well location (eight wells total). These samples will be analyzed for TCL organics, TAL inorganics and nitramines.
- Three surface water/sediment samples will be collected from the edge of Penniman Lake surrounding the Ammonia Settling Pit area. These samples will be analyzed for TCL organics, TAL inorganics and nitramines. Additionally, the sediment samples will be analyzed for Total Organic Carbon and Acid Volatile Sulfide/Simultaneously Extracted Metals.
- Four temporary groundwater monitoring wells will be installed and sampled at each sub-area (i.e., Ammonia Settling Pits and TNT Graining House Sump/TNT Catch Box Ruins). These samples will be analyzed for TCL organics, TAL total and dissolved inorganics, and nitramines.

- Perform a topographical and horizontal feature survey of the three sub-areas to establish accurate mapping.

These sub-areas of the Penniman AOC have not yet been investigated. Detailed figures presenting the site plan have not been developed. A Site Investigation Report, including figures and site photographs, summarizing results and conclusions of the field investigation (June 2001) is scheduled to be finalized in July 2001. Pending results of the Site Investigation Report, a RI/FS may be recommended for the Penniman AOC.





200 0 100 200  
1 inch = 200 ft.

**Baker**  
Baker Environmental, Inc.

# LEGEND

- ROAD
- BUILDING

FIGURE P-1  
SITE PLAN - PENNIMAN AOC  
AMMONIA SETTLING PITS AND TNT  
GRAINING HOUSE/CATCH BOXES  
CTO - 0172  
NAVAL WEAPONS STATION YORKTOWN  
YORKTOWN, VIRGINIA  
CHEATHAM ANNEX SITE

SOURCE OF BASE MAPPING: U.S. EPA AND WESTON ENGINEERS, 1998.

## **5.0 SCHEDULES OF INSTALLATION RESTORATION PROGRAM ACTIVITIES**

This section presents the project schedules for the sites at which future IR Program projects are proposed. Schedules depicting the major project activities for each site and the Activity are provided. These schedules are tentative and based on receipt of Navy/agency comments on submittals. Figure 5-1 presents a schedule summary for each site. Figure 5-2 presents a detailed schedule for each site. Figure 5-3 presents IR Program calendars for each month, through the end of the Year 2001. The schedules and calendars will be updated with future submittals of this document and do not reflect activities that have not been planned or funded to date.

## **SECTION 5.0 FIGURES**

Figure 5-1 - Installation Restoration Program Schedule Summary  
 Installation Restoration Program Site Management Plan  
 Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site

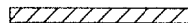
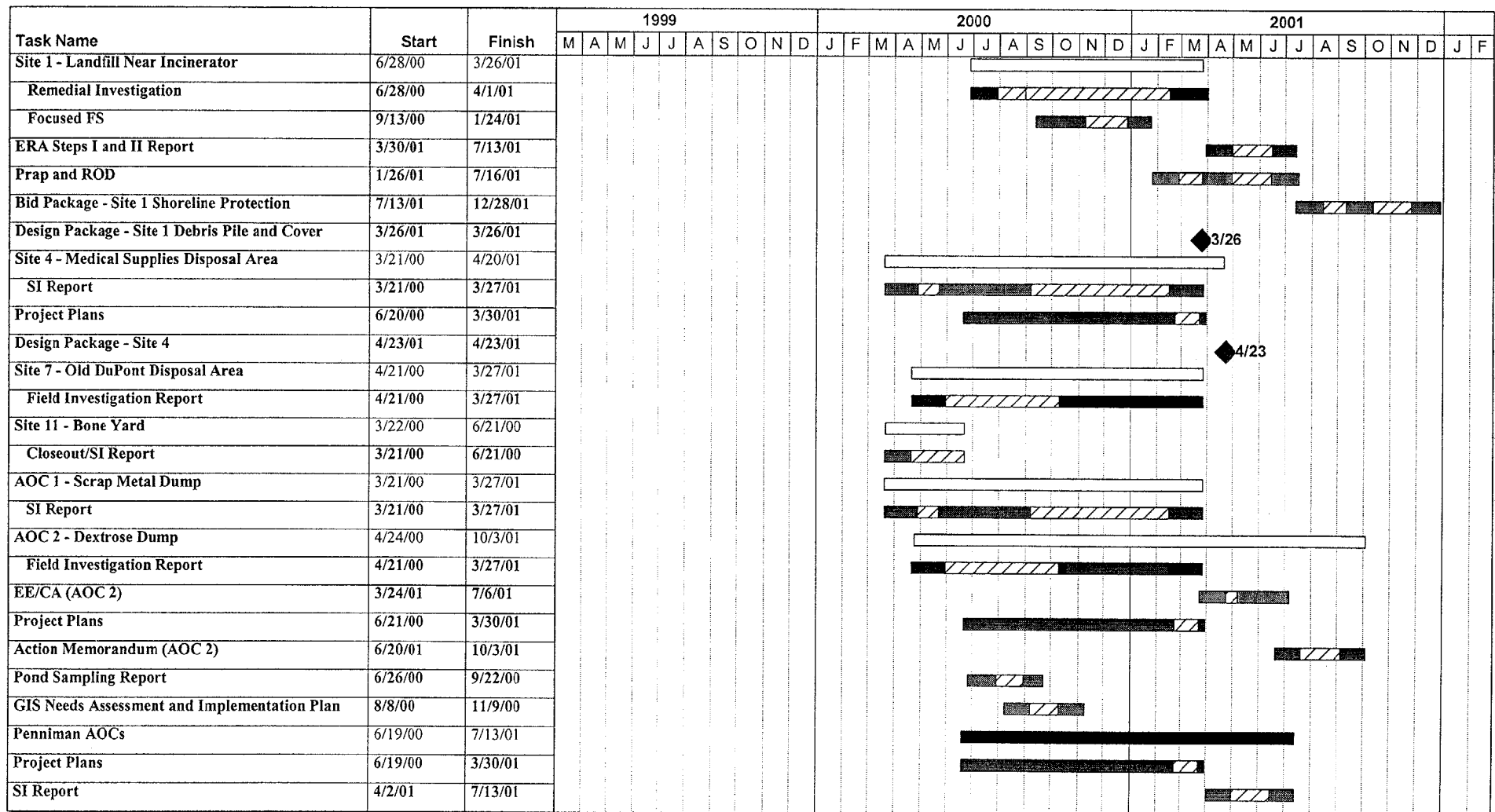


Figure 5-2 - Detailed Program Schedule  
Installation Restoration Program Site Management Plan  
Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site

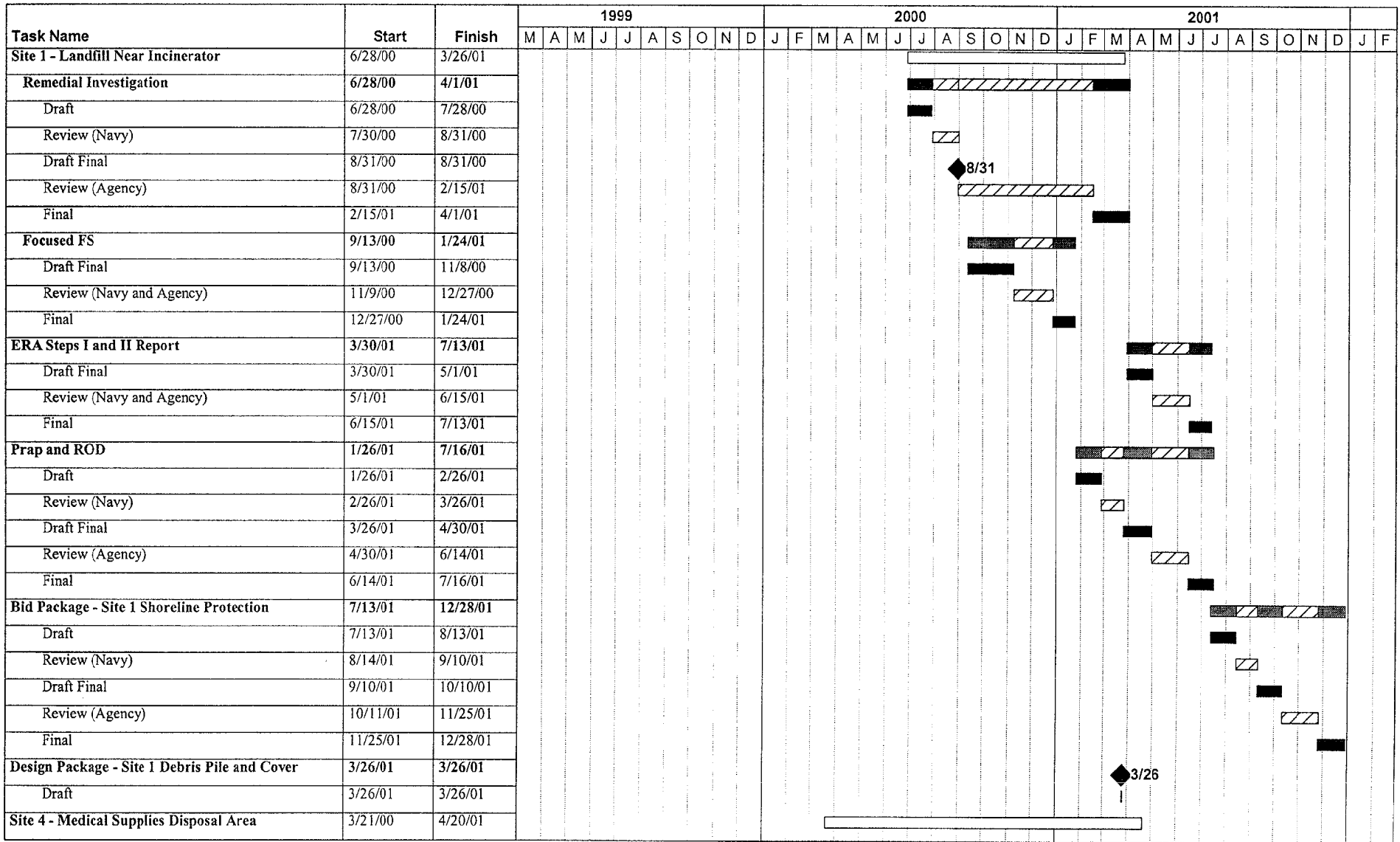




Figure 5-2 - Detailed Program Schedule  
Installation Restoration Program Site Management Plan  
Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site

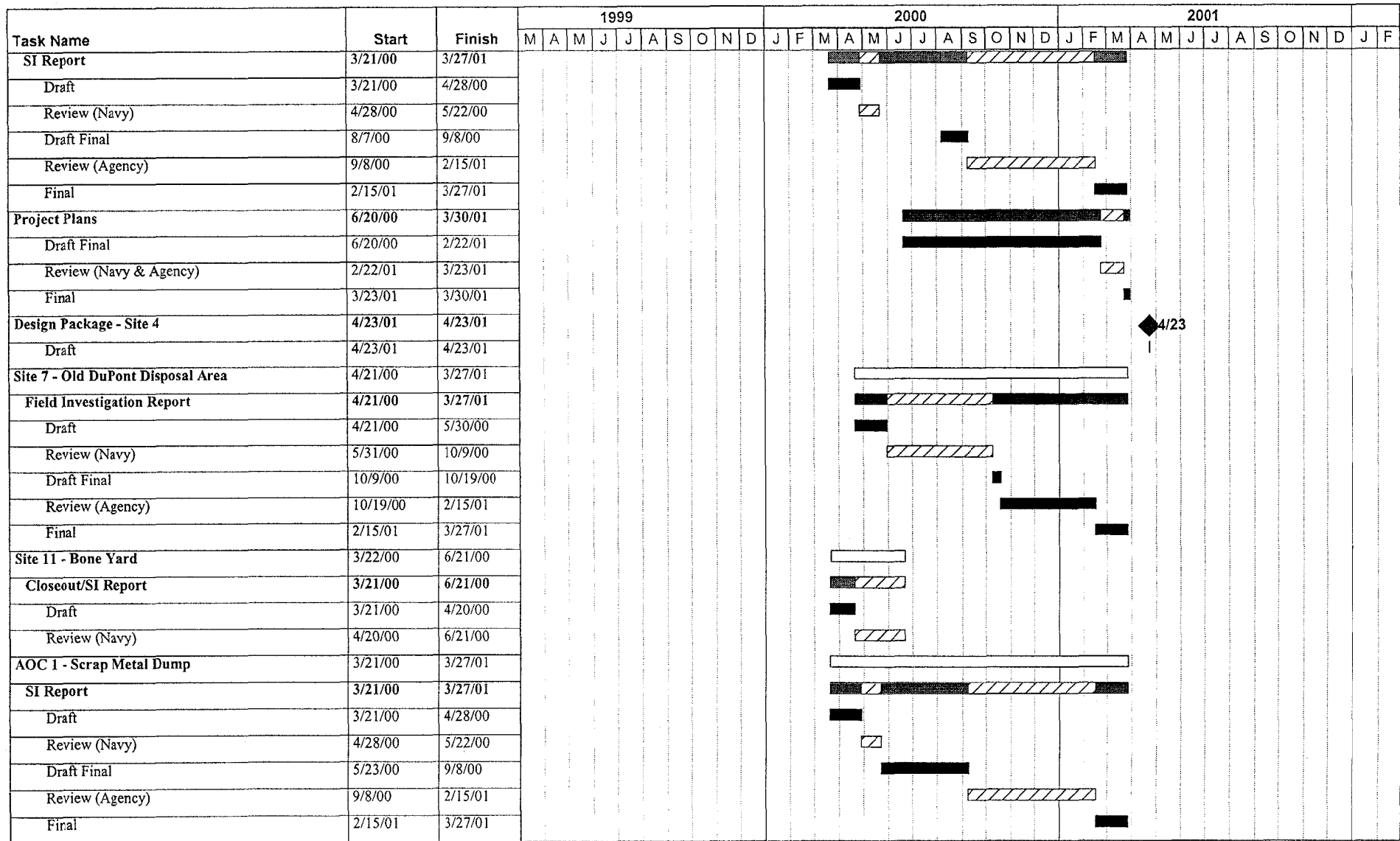


Figure 5-2 - Detailed Program Schedule  
Installation Restoration Program Site Management Plan  
Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site

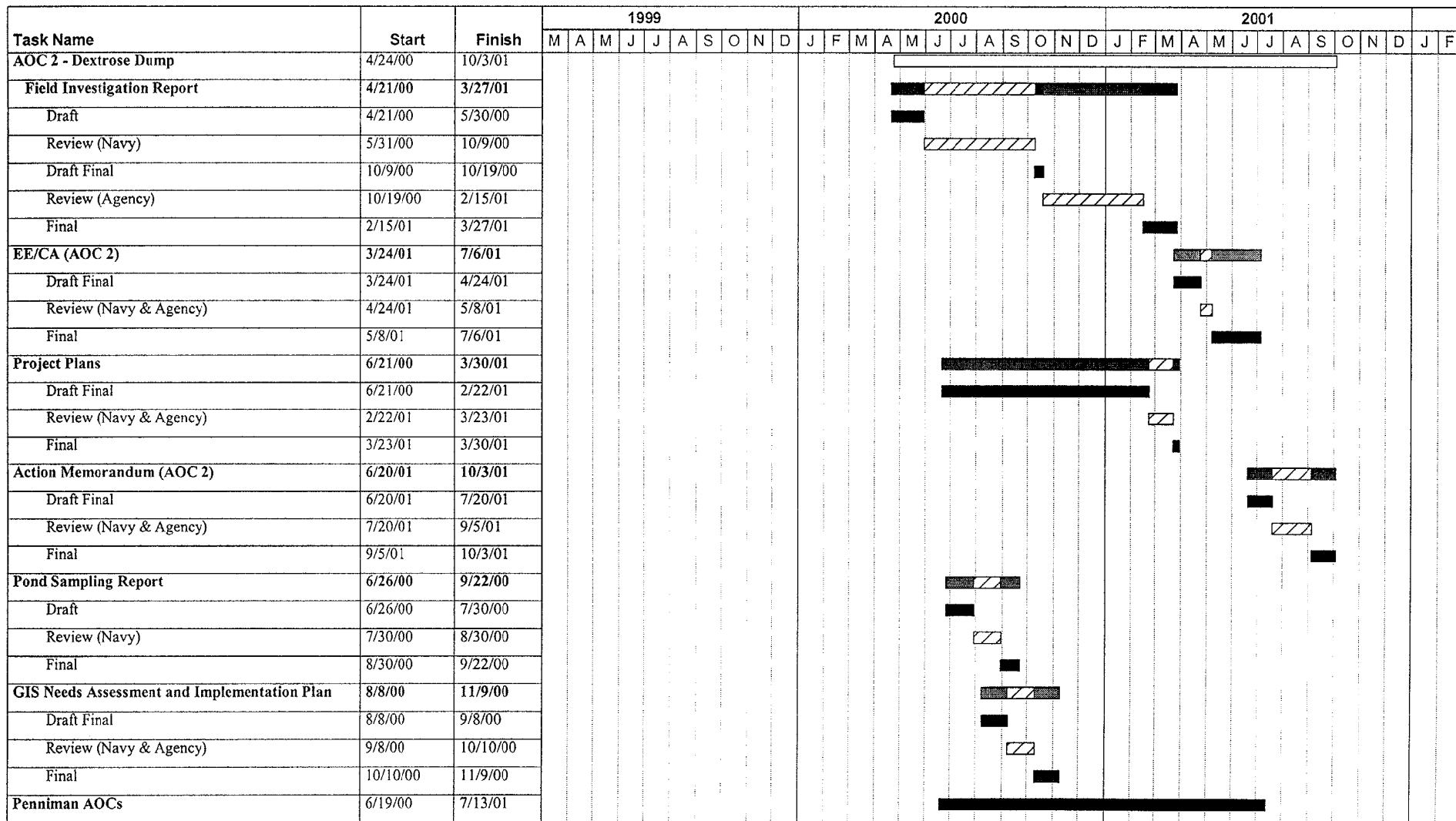


Figure 5-2 - Detailed Program Schedule  
 Installation Restoration Program Site Management Plan  
 Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site

Task Name	Start	Finish	1999												2000												2001													
			M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F		
Project Plans	6/19/00	3/30/01																																						
Draft Final	6/19/00	2/22/01																																						
Review (Navy & Agency)	2/22/01	3/23/01																																						
Final	3/23/01	3/30/01																																						
SI Report	4/2/01	7/13/01																																						
Draft Final	4/2/01	5/1/01																																						
Review (Navy & Agency)	5/1/01	6/15/01																																						
Final	6/15/01	7/13/01																																						

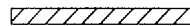


FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 2000						
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20 Baker to submit Draft Final SI Report (Site 4, AOC 2)	21 Received Comments from Navy on Site 11 Closeout Report - more pending	22	23 Baker submitted Site 1 TCRA Construction Close-Out Report	24
25	26	27	28 Baker submitted Draft Final Site Management Plan Update (FY01)	29 Navy to submit comments on Draft Field Investigation Report (Site 7, AOC 2)	30	

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
July 2000						1
2	3	4 Independence Day	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28 Baker submitted Draft RI (Site 1)	29
30	31 Baker submitted Draft Pond Study Report to Navy					



FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
August 2000						
		1	2	3	4	5
6	7 USEPA/VDEQ to submit comments on Draft Final SI Report (Site 4, AOC 1)	8	9	10	11 Agencies to submit comments on Draft Final SMP (FY01)	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28 Navy to submit comments on Draft RI (Site 1)	29	30 Navy to submit comments on Draft Pond Study Report	31 Baker submitted Draft Final RI (Site 1)		

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
September 2000						
					1	2
3	4 Labor Day	5	6	7	8 Baker submitted Draft Final GIS Needs Assessment and Implementation Plan and Draft Final SI (Site 4 and AOC 1)	9
10	11	12	13	14	15	16
17	18	19	20	21	22 Baker to submit Final Pond Study Report	23
24	25	26 Baker received VDEQ comments on Draft Final RI - Site 1	27	28	29	30 USEPA/VDEQ to submit comments on Draft Final RI - Site 1

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
October 2000						
1	2	3	4	5	6 Received comments from Navy on Draft FI Report (Site 7, AOC 2)	7
8	9 Columbus Day	10 Agencies to submit comments on Draft Final GIS Need Assessment and Implementation Plan and Draft Final SI (Site 4, AOC 1)	11	12	13	14
15	16	17	18	19 Baker submitted Draft Final FI Report (Site 1 and AOC 2)	20	21
22	23	24	25	26	27	28
29	30	31				

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
November 2000						
			1	2	3	4
5	6	7	8 Baker submitted Draft Final Focused FS (Site 1)	9 Baker to submit Final GIS Needs Assessment and Implementation Plan	10	11 Veterans' Day
12	13	14	15	16	17	18
19	20	21	22	23 Thanksgiving Day	24	25
26	27	28	29	30		

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
December 2000					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
	Christmas		Agencies to submit comments on Draft Final Focused FS - Site 1			
31						
New Year's Eve						

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January 2001						
	1 New Years Day	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24 Baker to submit Final Focused FS (Site 1)	25	26	27
28	29	30	31			



FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
February 2001						
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15 Baker received USEPA comments on Draft Final RI - Site 1, Draft Final FI (site 7, AOC 2), Draft Final SI (Site 4, AOC 1)	16	17
18	19	20	21	22 Baker submitted Draft Final Project Plans	23	24
25	26 Baker to Submit Draft PRAP and ROD - Site 1	27	28			

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
March 2001						
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23 Agencies to submit comments on Draft Final Project Plans	24
25	26 Baker to submit Draft Design Package - Site 1. Navy to submit comments on Draft PRAP and ROD - Site 1.	27 Baker to submit Final SI Report (Site 4 and AOC 1) and Final FI Report (Site 1 and AOC 2)	28	29	30 Baker to submit Final Project Plans	31

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
April 2001						
1 Baker to submit Final RI Report (Site 1)	2	3	4	5 Agencies to submit comments on Action Memorandum AOC 2	6	7
8	9	10	11	12	13 Baker to submit Draft Project Plans for Background Investigation	14
15	16	17	18	19	20	21
22	23 Baker to submit Design Package - Site 4	24 Baker to submit Draft Final EE/CA - AOC 2	25	26	27	28
29	30 Baker to submit Draft Final PRAP and ROD - Site 1					

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
May 2001						
		1 Baker to submit Draft Final ERA Steps I and II Report - Site 1 and Draft Final SI - Penniman AOC	2	3	4	5
6	7	8 Agencies to submit comments on EE/CA - AOC 2	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 2001						
					1 Baker to submit Draft Community Relations Plan	2
3	4	5	6	7	8	9
10	11	12	13	14 Agencies to submit comments on Draft Final PRAP and ROD - Site 1	15 Agencies to submit comments on Draft Final ERA Report Steps I and II - Site 1 and Draft Final SI - Penniman AOC	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30 Baker to submit Draft FY02 Site Management Plan

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
July 2001						
1	2 Baker to submit Draft ERA for Sites 4, 9, and 11	3	4 Agencies to submit comments on Draft Project Plans for Background Investigation	5	6 Baker to submit Final EE/CA - AOC 2	7
8	9	10	11	12	13 Baker to submit Final ERA Steps I and II Report - Site 1 and Final SI Report - Penniman AOC	14
15	16 Baker to submit Final PRAP and ROD - Site 1. Agencies to submit comments on Draft Community Relations Plan.	17	18	19	20 Baker to submit Draft Final Action Memo - AOC 2.	21
22	23	24 Baker to submit Final Project Plans for Background Investigation	25	26	27	28
29	30	31				



FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
August 2001						
			1	2	3	4
5	6	7	8	9	10	11
12	13 Baker to submit Draft Bid Package - Site 1 Shore Line Protection	14	15 Agencies to submit comments on Draft FY02 Site Management Plan	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30 Agencies to submit comments on Draft ERA for Sites 4, 9, and 11.	31 Baker to submit Final Community Relations Plan	

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
September 2001						1
2	3	4	5 Agencies to submit Comments on Action Memo - AOC 2	6	7	8
9	10 Navy to submit comments on Draft Bid Package - Site 1 Shore Line Protection	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
October 2001						
	1	2	3 Baker to submit Final Action Memo - AOC 2	4	5	6
7	8	9	10 Baker to submit Draft Final Bid Package - Site 1 Share Line Protection	11	12	13
14	15 Baker to submit Draft Basewide Background Report	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31 Baker to submit Final ERA for Sites 4, 9, and 11			

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
November 2001						
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26 USEPA/VDEQ to submit comments on Draft Final Bid Package - Site 1 Shore Line Protection	27	28	29	30	

FIGURE 5-3 INSTALLATION RESTORATION PROGRAM CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
December 2001						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31				Baker to submit Final Bid Package - Site 1 Shore Line Protection	

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